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HUMAN LIFE.

AMONG the most perplexing problems relating to humanity must be included the strange contrast between what men aim at in regard to human life, and what would result if their efforts were successful. It is an accepted principle of philanthropy that human life should be carefully nurtured in all available ways; it is a recognised test of good government and of satisfactory progress in civilisation that population should increase, and that sickness, pestilence, famine, war, and all death-dealing agencies should diminish. But suppose the efforts of philanthropy, political economy, and science in these directions were successful, suppose that in all the chief nations and among all the principal races the rate of the growth of population were increased, or even maintained unchanged, for but a few centuries—the merest second in the history of the world or even of races—what must inevitably happen ere long? Would human happiness be increased? Would, even in the long run, human life be extended? On the contrary, utter and irretrievable misery would ensue. The human race would deteriorate; nay, its growth and development suddenly ceasing, it would run considerable risk of coming to an untimely end.

I am not an admirer of Mr. Ruskin's philosophy—great though he may be as an art critic and as a rhetorician. I consider, indeed, the attention it has received a most depressing feature of the age, seeing that there is no connection between art and philosophy, or between eloquence and reasoning, and Mr. Ruskin's philosophy is shallow, his reasoning naught. Yet, underlying its absurdly fervid grandiloquence, the following bit of fine writing contains (or rather conceals) a most important truth. "Loss of life!" says the eminent art critic; "by the ship overwhelmed in the river, shattered on the sea; by the mine's blast, the earthquake's burial, you mourn for the multitude slain. You cheer the lifeboat's crew; you hear with praise and joy of the rescue of one still breathing body more at the pit's mouth; and all the while, for one soul that is saved from the momentary passing away (according to your creed to be with its God)"—[though as to this, Mr. Ruskin, "you can't quite always generally tell;" the soul thus saved may have—may not, in fact, have done so well]—"the lost souls, locked in their polluted flesh, haunt with worse than ghosts the shadows of your churches, and the corners of your streets; and your weary children watch, with no memory of Jerusalem, and no hope of return from *their* captivity, the weltering to the sea of your waters of Babylon."

If the thought underlying this turgid strain is just, if the saving of life cannot be regarded as always an unmixed blessing—and who can doubt this?—how much more obvious should it be that the numerical increase in the number of the living may become the reverse of a blessing, indeed little better than an unmixed curse, to the whole human race.

Before me lies a statistical record, from which I learn that in England, despite emigration and widespread pauperism (with attendant high mortality), the population, during the last twenty years, has increased at the rate of 1½ per cent. per annum, with every sign of growing at the same rate, or even at an increasing rate, for many years to come. Admirable country! excellent administration! encouraging outlook for the future! At this rate the population of the old country may be expected to increase tenfold in about 154 years. One rather wonders how the question of wages, already pressing rather seriously upon the English people because of undue numbers, and consequently too close competition (over-production of workers, in fact), will appear when the encouraging development of the population of England has gone on to this extent. Putting the present population of England at about 30,000,000, the population in 2031 will be 300,000,000, unless the encouraging growth of numbers should in some way be interrupted.

But let us look a little farther ahead. England is not so young a country but that we can look back over 621 years of her history, to the year 1256, when the first of our English Kings to celebrate a jubilee, Henry III., the rather mild son of the not exemplary John, had been fifty years on the throne. During the interval which has elapsed since then a great deal has taken place in England, but England has not grown in population at the rate at which she is growing now. For if she had that would mean that her population in 1256 amounted only to 3,000 persons, all told; and Cœur de Lion, Henry III.'s uncle, used up ten times that number at least in fighting only. It would seem, then, as though the population of England had not only been growing, but growing at an increasing rate—a result, indeed, which follows still more obviously if the actual population in successive centuries, from the time of William the Conqueror onwards until now, be considered. We may then at least look forward for a continual increase at the rate of 1½ per cent. during the next six centuries. What, then, will be the pleasing state of affairs in England in the year 2500 or thereabouts? The population increasing tenfold in 154 or 155 years, will by the year 2500 have increased 10,000-fold, or will amount to 300,000,000,000, exceeding some 200 times the probable present population of the whole earth. There will then be about six square feet of space for each inhabitant of England; and by that time, we may assume, the three-acres-and-a-cow idea will have had to be given up by the statesmen swaying those 300,000,000,000 "under Britain's royal sceptre then." As for the "imperial sceptre" with its sway over the colonies and subject populations of Great Britain, it would be difficult to say how it would work, even if the 9,000,000 of square miles forming Great Britain's present empire should by that time have increased to 20,000,000.

But the future of the United States, viewed in the same way, is not less "encouraging," according to one view, or less appalling according to the other. The population of America doubles in about twenty years, or five times in a century, five doublings meaning a thirty-two-fold increase. In four centuries, at this rate, the increase of the population of the United States would be about a million-fold (thirty-two times thirty-two times thirty-two times thirty-two times), or the population would amount to sixty millions of millions, or thereabouts. This would be a population of about 16,000,000 per square mile, or 10,000,000 per square mile, assuming a fair absorption of surrounding territory, and 4,000,000 per square mile if the whole of North and

South America were available for the American population. About three-fourths of a square yard of surface would then be available for each inhabitant of the double continent. If the whole earth were peopled by these 60,000,000,000,000 Americans, there would be nearly three square yards of space for each person!

Of course we know that there is no likelihood of any race or nation increasing in population even at such rates as 1½ per cent. for several centuries in succession. It is not because of any real danger (or hope) that England, for example, which now boasts of this rate of increase during a quarter of a century, or the United States, which boasts of a much greater rate of increase during a much longer time, will continue to grow at this rate, that I have presented the above startling figures. But it is worth while to consider a little how far we are entitled to "rejoice and be glad" over what we regard as progress, when it is clear that the progress cannot possibly continue without ruinous results for the whole human race.

Especially startling, or rather oppressive, become the thoughts suggested by this so-called progress when we remember how much more rapid is the progress of exhaustion of our earth's accumulated stores on which the growing population of the earth in part depends.

It might or might not be possible for the present population of the earth to live, as of old the inhabitants of earth were content to live, upon the annual produce of the earth—on the earth's income, not on her capital. But assuredly whether this might be done or not, it is not done at present. Year after year the buried stores of life, for that is really what they should be called, are being brought in greater and greater quantities to the surface, and used to supply the human race with much more than the necessities of life.

In two States of the Union alone one kind of accumulated earth life, the petroleum and natural gas store, has been so rapidly used up that within one generation alone stores which were millions of years accumulating will have been almost wholly exhausted.

In Great Britain 150,000,000 tons of coal are yearly brought to the pit's mouth, though it has become clear that the effective supply will be exhausted at the present rate of consumption in the course of ten or twelve generations at the outside.

The forests of the earth, at any rate in all civilised countries, are being steadily destroyed, though it would be quite possible so to arrange matters that the supply used each year should be replaced by new growth during the same time.

Like a spendthrift, the human race of to-day, boasting itself "the heir of all the ages" in intelligence, is consuming at a rate fully one-hundred fold beyond what is just the supplies which, as heir of all the geological æons, it has received—in trust partly for future generations.

That men should rejoice when statistical records attest the steady growth of all civilised nations in population, at the very time that the stores of the earth are being wastefully consumed, is as though the father of a growing family should rejoice at each addition to his family circle, at the very time when each year's accounts told him that his means of providing for them were rapidly growing less, and exhaustion was imminently threatened.

I have occasion often, as a student of astronomy, to touch on the gradual dying out of the earth's vitality, and to descant on the limited nature of the sun's supply of life-giving energy. I remind my audiences in lectures, and my readers in books and essays, that as the moon has died so must the earth hereafter die; and that as among the stars (those other suns than ours) we find suns that are manifestly fading in lustre and even evidence of orbs which, though once lustrous, are now dark and dead, so must our sun one day lose his light and heat, and with them his power of sustaining life in the worlds circling around him. But I doubt whether the inhabitants of our world need be very much interested in the future darkness of the sun or in the coming decay and death of the earth. The human race is taking excellent care that its duration shall not extend to either of those dismal times (whichever of them may be the first to come). Millions of years probably before the sun is dark, millions of years before our earth is dead, the civilised human race will have exhausted all that it has to live on, and will have come to an end through sheer inanition.

No discovery of new scientific appliances can avail to save our kind from this end, seeing that every such discovery would inevitably lead only to the more rapid exhaustion of the earth's garnered stores. Progress in civilisation, at least along the present lines, can only hasten the coming of the end. For civilisation, as at present understood, culture as at present alone appreciated, imply steady advance beyond the supply of mere necessities, beyond the mere support of life—the steady development of new wants, fresh pleasures, and greater luxury. Nothing could avail to make the increase of life, which so many contemplate with satisfaction, a real gain, or even to justify it, but some such change in the ways of the human race as Cornaro adopted for his own individual habit of life. When he found that he was exhausting the very springs of life, wasting the stored-up constitutional energies of his frame by unduly luxurious living, he wisely changed his way of living to what his friends regarded as a foolishly abstemious regimen. Condemned by the unanimous voice of the physicians to death within two years, he so developed his vital energies that he lived for sixty-four years instead of two, attaining the ripe age of ninety-nine years before death claimed him. Moreover, whereas in the fulness of his youth and manhood life had been but as a burden to him, life during the last three-fifths of his time—for a quarter of a century beyond the four score years, when, the Psalmist says, life is but labour and sorrow—was to him well worth living, nay, full of satisfaction and delight.

The human race is at present certainly advancing with swift strides towards a very desolate condition, if not towards death. It is not getting very much satisfaction out of its wasteful and thoughtless manner of living. If a few optimists recognise promise of good, more among us pessimistically ask the doleful question, "Is life worth living?" The meliorists who, deploring the evil, still see hope of change to wiser ways are few and low-voiced. Not regimen, which is really needed, but recipe is chiefly suggested by short-sighted men (whom the world mistakes for philosophers) to improve this state of things. Philanthropy, communism, socialism, anarchy, in turn hold out promise of improvement. But in the meantime the stores of life, on which the vitality of the human race as such must depend, are being used up at such a rate that the time of final exhaustion lies within measurable distance. And the statistician boasts, because the records of birth rates and death rates show that the end must be even nearer (supposing no change should take place) than it would be if consumption went on no more quickly than it is already doing.

THE STEAMERS of the new American "Arrow Line" are to be constructed upon a new principle, and with a view to an estimated speed sufficient to make the voyage between New York and Liverpool in a little more than four days. The *Pocahontas* will be 540 feet long, will be provided with 1,060 water-tight compartments, 500 of which are to be below the water-line, and will have twenty boilers with engines of 27,986 horse-power, and capable of giving a speed of 22 knots an hour.

PLEASANT HOURS WITH THE MICROSCOPE.

By Henry J. Slack, F.G.S., F.R.M.S.

NEW phenomena in nature excite more astonishment than the great changes in form, habits, and capacities which many creatures visibly undergo in their passage from an infantile to an adult state. The transformations of insects must have been the first to attract attention, unless perhaps the change of the tadpole to the frog may have been recognised at a still earlier time. The higher animals have their transformations, but do not begin an independent existence until they are approximately finished. No one could hesitate in recognising a kitten as a small cat, or a puppy as a little dog, but without actually seeing it come to pass, no one would imagine that a caterpillar was an incipient butterfly, or a tadpole an incipient frog. As more and more is known of the ways of nature in the organic world, greater numbers of instances are noted in which early life stages are passed under such differences of aspect and organisation as to throw into confusion all ordinary notions of individualism and species. Are caterpillar, chrysalis, and butterfly one individual, or three? If we make a jump from the lower forms of life to man, we might consider continuation of self-consciousness as sufficient evidence that child, youth, and man were one and the same personality, but, how when, as occasionally happens, there is a breach in the continuity, the same man or woman exists in two or more distinct lives, each having peculiar and separate ideas, recollections, thoughts, emotions, and characters? If, when we study the highest life known to us, it seems that a man can be somebody else besides himself, we may the less wonder that in simpler organisms several apparently complete, distinct individualities may all successively belong to one and the same creature.

To constitute a species it used to be thought sufficient to show that a particular form, structure, and character were transmitted with considerable accuracy and precision through many generations, but in recent times a vast number of instances have been discovered in which the earlier and the later forms of the same creature are widely different. Some of the most remarkable cases have been detected amongst the infusoria through the researches of Drs. Dallinger and Drysdale. In one set of their very remarkable investigations they found that after keeping a maceration of cod's head for two or three months, vast numbers of a certain monad appeared as little egg-shaped bodies about $\frac{1}{3000}$ of an inch long, and provided with two long very slender whips. These multiplied rapidly by self-division, even the slender whips splitting in two. Here then, according to old notions, was a good species, but by incessant watching from hour to hour and week to week, a small triangular creature, swimming with four whips, which had not been suspected of any connection with the preceding animals, was found to be related to them in a most curious way. In the same field were some minute globes, showing nuclei, and gently waving a couple of whips, between which, after a period of quiescence, a small cone of sarcode was pushed out, and prolonged into a whip. By further processes this whip divided into two, the globe became oval and then split in two. The creatures thus formed each joined one of the first-mentioned animals, their bodies united and grew into a triangular object, with two pairs of whips. After a time the whips disappeared, and the object looked structureless and dead. Then an internal commotion ensued, and finally the thing burst and discharged swarms of the minutest dark granules, the germs of new generations.*

Discoveries of this kind not only gave an invaluable help to the Darwinian theory, but prepared all thoughtful microscopists to be very cautious in assuming infusorial objects to represent in an exclusive way anything that it would be either philosophical, or provisionally useful, to call a species, unless its entire life-history had been traced out.

A discovery by Mr. Saville Kent, and described in his great work on the Infusoria, has an interest similar to those of Dr. Dallinger. He found that a well-known and highly interesting infusoria, the *Actinophrys Sol*, was the final condition of an animal that had previously existed in two other forms, each differing widely from the other, and also from the last stage. Copying Mr. Kent's figures, we find (1) a pear-shaped bag, full of fine granules, with a large round vacuole near the thickest end, and a delicate whip springing from the thin one. This is not at all an uncommon form, and there is nothing in its appearance to indicate what it is likely to do, or how to distinguish it with any certainty from similar monads which will not undergo the same changes. The second figure looks like a distinct species. Instead of a smooth pear-shaped body, we see one roughened all over with large conical projections, but retaining the whip-like swimming organ (*flagellum*). Finally we have a delicate globe, with a vacuole, a nucleus, and an aureole of extremely fine rays springing from the internal

Fig. 1.

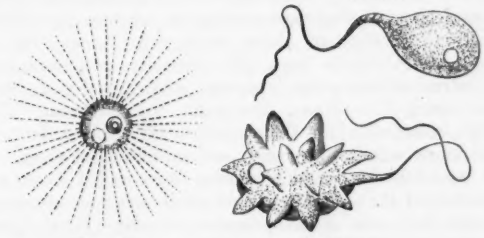


Fig. 3. Fig. 2.

sarcode mass. The pear-shaped form not only differs entirely in appearance from the actinophrys form, but the mode of life and organisation is changed. The first has a mouth into which it takes the food it can swim after and catch. The actinophrys waits till some appropriate object happens to touch one or more of its rays, when they seize it as a thread of glue might do, and draw it into the globe. The first appearance of the rays in the transition from form 2 to 3 was sudden, "like the bursting of a rocket, or other firework," and the creature retains the power of rapidly withdrawing or protruding these remarkable organs. It can also move them slowly, and they must be able to exercise a selecting power. If they were merely like sticky threads of glue, the whole creature would soon be buried under useless matter, as it lives in waters abounding in all kinds of particles which other creatures cause to stream in all directions by the movements of their cilia or flagella.

In the pear-shaped form we recognise nothing to remind us of the amœba, but the delicate rays of sarcode in the actinophrys form suggest relationship to various groups of creatures, with or without shells, who obtain their food by extending pseudopodia of sarcode, which, whether thicker or thinner, resemble in properties the prolongations of the naked amœba.

A stout form of stalked actinophrys (fig. 4) was found by

* See *Monthly Microscopical Journal* for 1873.

the writer to be common in a rockpool at Oddicombe Bay, Devon. It was provided with numerous rays in the form of long slender cones, terminating in sharp tips. The body was full of opaque particles, which prevented any structure being detected. Some of these objects kept their rays steadily and fully extended, others had drawn all or part

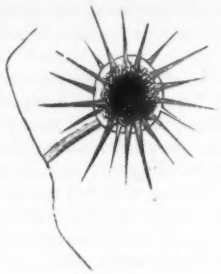


Fig. 4.

in and some of them did not preserve the globular shape of the body.

Watching one of the fully-expanded specimens at intervals for several hours I was rewarded by the sudden disappearance of all the rays. They vanished like light rays suddenly stopped by a screen. They soon came out again, but not so quickly. The animal evidently had full control of these processes, as on other occasions it withdrew them slowly, and sometimes varied the mode of protrusion, and also of retraction. These movements sometimes occurred symmetrically, all the rays moving in or out in uniform proportion. At other times some rays were fully retracted, while others were left partially out, and once the protrusion was quite irregular, some pseudopods being thrust across the others, deranging the pattern. This, perhaps, occurred when the creature was tired or lazy. I do not know whether any one has been fortunate enough to trace the life-history of this marine form, and I have seen no account of it. Mr. Gosse told me it was very common.

Under the name of *Actinomonas mirabilis*, Kent figures a singularly beautiful object rayed like a delicate actinophrys, standing upright upon an extremely slender and long stalk, and provided with a long whip, whose wavings and lashings would cause currents in the water, and thus bring food within its reach. He found this type in a jar of sea-water he had kept sundry creatures in for some weeks at Jersey. The rays were so close and fine that, under low powers they looked only like a haze surrounding the little globe, and required a magnification of 800 to display their true character. Kent's remark that the developmental and reproductive phenomena of this remarkable group (*Actinomonas*) have yet to be determined is probably still true, and leaves ample room for further interesting observations.

HEIGHT OF CLOUDS.

By Dr. R. F. Hutchinson.

MUSSOOREE is one of our favourite hill-stations in the great Himalaya range, and is very easily reached by rail and road. Its position can be found by running the eye northwards (on any good map) from Agra on the Jumna. Its Mall is 6,000 feet, and its highest peak 7,026 feet above the sea. Below it, and 2,239 feet above the sea, is the wonderful valley of Dehra Dūn, 3,761 feet below the Mall. Of this more anon. No locality in the world can boast of such views as Mussooree. Stand on the Mall and look towards the plains of India, stretching away to the south and melting away in the purple distance; turn to the left, and you see the holy Ganges emerge from its rugged glacier-headed rift in the mighty Himalayas, struggle across the Dūn, burst through the barrier of the fossiliferous Siwálik hills at the sacred shrine of Hardwár, and then commence its long pilgrimage seawards. Just below Hardwár its right bank is tapped by the huge Ganges canal, a river in itself, 654 miles long, rejoining the parent stream at Cawnpore, after giving off 3,078 miles of distributaries. We distinctly see the canal, and Roorkee, the head-quarters of the Royal Engineers, with its enormous workshops on its left bank; and on a very clear day the church at Meerut has been recognised with a telescope. Turning to our right, we see the Jumna, glacier-born like the Ganges, crossing the Dūn, passing through the Siwálik range, and flowing away Delhi-wards, to join the Ganges at Allahabad. Let us climb one of the hilltops above the Mall, and what a sight meets our gaze! Snow-clad peak on peak and Alp on Alp stretching away, away to the north-west and south-east, and lost in the shimmering haze of their own exhalations—all giants varying from 24,000 to 26,000 feet high.

We can now revert to the subject of the paper, bearing in mind that the Mall is 3,761 feet above the Dūn level. On two occasions I witnessed the following glorious sight from the Mall. Below me lay a vast expanse of the purest flocculated cotton wool, entirely obscuring the plain of the Dūn; above me the pure cerulean. My sky was clear; that of the valley was obscured by cumulus. Aware of the chance that I now had, I looked about for landmarks whereby to measure the height of the stratum, and caught a house 900 feet below me, which was first touched by the woolly expanse, and therefore enveloped in fog. The figures, therefore, were clear—I was 6,000 feet above the sea level, and the valley below me was 2,239 feet above the sea, or 3,661 feet below me. But the cumulus stratum was 900 feet below me, and therefore 2,761 feet above the Dūn valley.

On another occasion, in the Rains, I was watching the ever-changing panorama of the Dūn, and caught sight of three thunderstorms slowly passing up the valley from the south-west, and apparently a mile apart, perhaps two. As they came abreast of me it was most interesting to watch the warfare of these storm-clouds. The dark nimbus was triangular, the apex downwards, shading off into the lines indicating rain, illuminated now and then by lightning flashes. The three storms were to me most businesslike in their movements and actions, and each seemed determined to assert its own dignity and importance. I watched them with interest and amusement, for while I was in sunshine and under a cloudless sky, each village over which each nimbus passed had its "heaven black with clouds and wind and great rain." The most remarkable fact regarding these vagrant nimbi was the constant fire of their artillery. One would have fancied that their electricity would have been exhausted soon after they left the far south-west, where I first detected them; but, on the contrary, they acquired strength as they went. Were they Leyden jars kept full as they went by the friction of their own movements?

Now, about the height of these storm clouds. As before stated, I was looking at them from an elevation of 3,761 feet above the Dūn valley, which is bounded to the south by the Siwálik hills, which rise to a height of 1,500 to 2,000 feet above the plain. I caught them passing a 1,500 feet peak, and they were below my line of vision, say by 300 feet roughly; then each nimbus would be 1,300 feet above the Dūn, while the cumulo-stratus was 2,761 feet above the valley. The average elevation of both phenomena

would thus be 2,020 feet, which I believe to be correct. Apropos to cloud scenery. I am sure that, like myself, you have often from deck or shore stood entranced at the glorious and ever-changing piles of cumulus heaped on the horizon. That grand old sufferer, Job, was asked—"Can *any* understand the spreadings of the clouds?"

Can any one stand on the seashore, or on the deck of a ship at sea, and watch on the horizon the piled-up and ever-changing masses of snowy cumulus cloud, here assuming grotesque forms, there stretching away into illimitable vistas, as if forming approaches to "the plains of Heaven," without wondering at the mysterious character of those glorious dissolving views? Can any one watch uninterested the delicate and feathery forms of the cirrhus cloud, which every moment changes and assumes new beauties, apparently without an effort? Can any one gaze unmoved upon the dark and lowering nimbus as it approaches in solemn grandeur, its dark recesses lit up by fitful lightning flashes? Can any one watch the awful warfare of struggling clouds in the cyclone, when the might of Him who makes the clouds His chariot, and walketh upon the wings of the wind, is most manifestly displayed in connection with the utter helplessness of man, and answer this question? Can any one gaze rapturously upon a rising or setting sun, lighting up the surrounding clouds with glorious effulgence, or painting them with tints most gorgeous, and then understand the "spreadings of the clouds"? What would you not give to witness again the following sight:—"Did you notice the wonderful atmospheric effects that were visible at Madras last Thursday? (July 18, 1872.) I think I never saw anything more beautiful, or anything more lifelike. For an hour or two the city, situated upon a flat plain, was surrounded by mountains as lofty and scenery as grand as any that Scotland, or even Switzerland, could boast of. The city was surrounded by a bank of clouds that formed a magnificent girdle of mountains—some black and frowning, others snow-clad, whose

> Rocky summits, split and rent,
> Formed turret, dome, and battlement;
> Or seemed fantastically set
> With cupola or minaret;
> With crest as pagod ever decked,
> Or mosque of eastern architect.

Going towards this magnificent pile of cloud-mountains was like entering a pass; and, further on, the snow-clad peaks made me believe myself back in times long gone by, when, with alpenstock in hand, I crossed the Bernese Oberland, and looked up with eyes dimmed with delight at the glorious Jungfrau."

FIRE-WORSHIP.*

NOTWITHSTANDING long persecutions, which have continued over one thousand years, and only now are beginning to relax, and permit the Fire-Worshippers of Persia to worship there unmolested, a small, steadfast band has always remained in that land, preserving the faith of their fathers and their rites and ceremonials unchanged.

In Persia they are called Guebres. This is simply a corruption of the Arabic term Kaffir, which means an heretic, an unbeliever. In time it has become a word of contumely and scorn.

Although so few in numbers, yet the Guebres are a most interesting community, for in them we see the old Persian stock of the days of Cyrus and Xerxes unmixed with any other race; while the religion they practise is that which was introduced into Persia, or perfected by the famous Zoroaster, or Zerdusht, who lived at least twenty-five centuries ago.

Zoroaster was born in the northern province, called both then and now Azerbaïjân; this name means the region of fire, and it may have been so called because the religion whose distinctive doctrine is supposed to be the worship of fire had its origin there. It is only just to state that intelligent Guebres repudiate this doctrine. They assert that it is a mistake to call them Fire-Worshippers. They say that fire is to them not an object of worship, but only a symbol of the beneficent Oromasd, or good God, who is clear and radiant and pure, like the glow of the rising sun or the flames of fire, and that it is through the symbol that they adore the good Spirit.

This may be true of the more intelligent followers of the doctrines of Zoroaster; but there is no doubt that the ignorant classes believe that light and fire are real emanations of God, and worship them as such. Fire is by them held so sacred that they never smoke tobacco, and for that reason it is not by them considered courteous to use the weed in the presence of a host or guest who is a Guebre.

In every household of the Guebres fire kindled from the sacred flame at the new year is kept burning the entire year. That is the purpose they follow; but whether they always succeed in preventing the fire from being extinguished is doubtful.

The Guebres have many peculiar doctrines and customs. One of these is the use of yellow in their garb; another concerns the theory of immortality. They maintain that there are two principles, the good and the evil, which they call Oromusdao and Ahrimasdao. The ancient Greeks corrupted these names to Ormusd and Ahriman. These two principles, or influences, fight for the mastery through the ages, seeking to win possession of the soul of man.

The new year is called by the Guebres the No Rooz, or New Day. It comes at the time when the sun crosses the line in March. Their traditions state that this festival was ordained by their great legendary King Shah Iemsheed. Although most of the Persians are now Mohammedans, yet they all accept the period for the commencement of the new year established in their country long ages before the camel-driver of the desert sent his armies to force them to his creed; and thus, at the No Rooz, Guebres and Mussulmen alike rejoice. The latter pretend that they celebrate the occasion because it is the birth anniversary of their Prophet, but this is a mere flimsy excuse, concocted in order to show their disdain for the Guebres. But in a hundred ways the Persians show that in their celebration of this annual festival they are following the traditions of their fire-worshipping ancestors.

Nowhere is the new year celebrated with more mysticism and pomp and universal rejoicing than in Persia. For weeks before it arrives the people begin their preparations for the occasion. Every one seeks to raise money to purchase the new suit of clothes he is expected to wear at the time, and the confectionery and provisions for the ten days of feasting, as during that period the shops are mostly closed. So important is it to be properly prepared for the No Rooz, that articles of price that are family heirlooms are often sacrificed in order to provide the needed money.

When the new moon of that month appears devout Persians look to the east, then, covering the face with their hands, they are slowly turned until, on withdrawing the hands, the gleaming sickle of the new moon is seen directly in front. Perhaps our superstition about discovering the

* From an article by Mr. S. G. W. Benjamin in the *Youth's Companion*.

new moon over the right shoulder is suggested by this Persian custom.*

The eve before No Rooz is also the occasion for a curious ceremony, evidently suggested by the mystical meaning the Guebres attach to fire and light. The common people leap over heaps of burning brushwood laid in rows. It is possible the heathenish custom alluded to in Scripture of "passing children through the fire" may be a form of this ceremony.

As the hour approaches for the sun to cross the line, the Shah assembles in the great audience-chamber of the palace with the high spiritual and temporal dignitaries of the kingdom. Money is distributed to all for good luck on the commencement of the New Year. At the moment the astrologers announce the No Rooz, the Shah gravely exclaims, "*Mambarêk bashêd!*"—"May it be propitious to you!" A sacred song of rejoicing is then sung by a mollâh, or priest; after this each courtier, according to his rank, offers his obeisance to the Shah, and receives a present from the royal hand.

THE BLANKET-FISH.†

"DO you see that short, thick-set man sitting on the boat?" asked a lounger at San Pedro; "well, he is an ex-pearl diver, ex-smuggler, ex-everything, and can tell some strange stories of this part of the world."

A little later I was introduced to the diver, who was a half-breed Mexican. He laughed when his experiences were referred to, and replied: "They were nothing. I have left the business, and have done with it for good or bad. It's a dog's life, this diving, and I wouldn't go back to it for anything you could offer. Why? Well, I am tired of it, and I was covered with a blanket-fish on my last trip down, and the second time means death."...."Am I sure?" And the half-breed smiled. "Well, I never knew it to fail. There were Ramoles, Narra, Nalona, all from my family, killed by the blanket-fish, and everyone had his warning. It is not necessary to believe it. I do, however. It is not a thing a man would be likely to forget.

"I have seen a good many of them in my time, but I was never cornered except once, and that was a year ago. I was one of the party that went to the pearl grounds in the *Centipede*, the boat that was never heard of after her next cruise. It came my turn to go down, and over I went; but as soon as I got down I felt that something was wrong—that something was going to happen—as soon as I struck the bottom. I landed among a fine lot of pearl shells, and had begun to fill my basket, when all at once I noticed a darkening about me, and looked up. I saw what appeared to be a blanket slowly settling down over me. I knew I had a chance; so I crowded down close to the bottom, hoping the fish wouldn't see me, and by luck it didn't. Just as it was ten or twelve feet off something alarmed it, and it drifted away. I was hauled up more dead than alive. I judged that the fish was at least thirty feet across, and if it had settled on me nothing could have saved me."

"This blanket-fish," said an American later on, "is nothing more nor less than a big Ray, and these yarns, though founded on fact, are a good deal overdrawn, though I am willing to confess that I have been as badly scared as the Mexican you speak of. It was in this way. Some time ago I was down the coast on a trip, and one evening I saw what I supposed to be a shark sailing about near the vessel. Wishing to have some sport, I put out the small boat, and, taking two or three men, pulled over to it. As it came by I put a harpoon into it. The next moment there arose from the water a Ray that must have been twenty-five feet across at least. It looked as big as a house, and as soon as it showed up my men screamed out, 'The blanket-fish!' They were Mexicans, and half scared to death. A moment later we were rushing over the water faster than I ever went before or since. The fish took us up the little bay, then turned and came down toward the schooner, going like a steam-engine. We piled up in the stern to keep her from sinking. Just as we got opposite the schooner the fish drove right under her, about amidship. Before we could make a move to cast off, we struck the schooner. To make a long story short, we found ourselves in the water alongside. The rope had broken, and the blanket-fish was gone. The force of the contact had smashed the cutwater of the boat in pieces.

"The divers have an idea that these fish settle down on you, as they have a very broad surface and a peculiar undulating motion in the water, using the side fins like wings. They are almost as powerful as a large whale, and one twenty-five feet across could undoubtedly move off with a large ship. In almost every locality where they are found stories are told of their carrying off vessels. Several instances of this have happened in the Gulf of Mexico, where devil-fish, as they are called there, have run off with smacks and small fishing vessels during the night. In one instance a skipper 'turned in' at night in a harbour, and awoke in the morning to find himself out of sight of land; a big devil-fish had run foul of the anchor and gone out of the channel so silently that none of the crew noticed it!"

Tampa Bay, Fla., is a famous place for these monsters of the deep, and often schools of a dozen or more are seen swimming about in circles. These Rays are among the largest fish known. Two immense fins extend out from each side, while from the tail projects a long lash-like whip, capable of doing severe execution. The writer was once poleing a boat over the Florida reefs in the vicinity of Key West, when a comrade, who had been sitting astride the cutwater dangling his feet in the water, threw himself back into the boat with a yell of pain, while a huge black Ray darting off over the white sand told the story. Both of his feet were cut almost to the bone. The weapon that produced the injury was a delicate, whiplike lash, smaller than a man's little finger.

On still nights in sub-tropical regions the Rays are often chased by sharks, and leap from the water in their attempts to escape, falling with a tremendous crash. The man-eating sharks with their thick skins are safe from their attacks, and often bite out great pieces from the side fins of the monsters.

At San Pedro and the various watering-places from San Diego north the Ray family makes itself disagreeably conspicuous. The smaller ones have a habit of hiding in the sand and presenting their spines for bathers' feet, while others are provided with electric batteries, which not rarely give the fishermen powerful shocks. I have known a man to be disabled for several days by harpooning one.

The Chinese monopolise the fishing in these waters, and are often victims of the practical jokes of the Mexican and American fishermen. An able-bodied torpedo will be brought ashore at San Pedro or Monterey, and the whites will wager a green Chinaman that he cannot lift it. The fish

* Something would depend on the way in which the turning was, from right to left or from left to right.

† From the San Francisco *Call*.

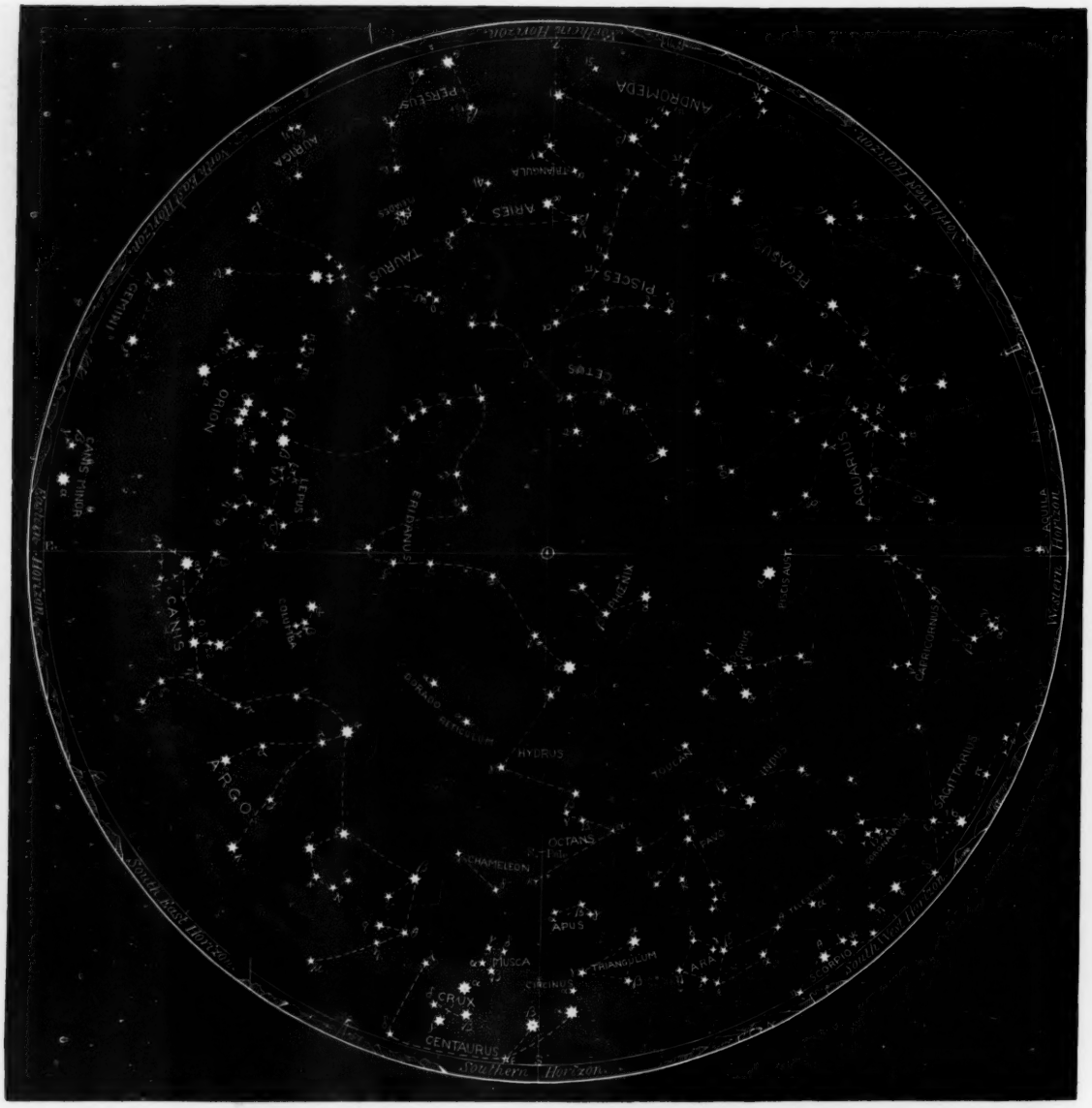
appears to weigh about six or eight pounds, and "John," after putting up his money, with a laugh at the simplicity of the "American devils," takes hold with both hands, and is stiffened out so quickly, that often he can do nothing but hold the fish and roar with anguish until he is released. The shock given by these fishes has been compared to that of a single Leyden jar, and can be plainly felt by fifty persons in a circle.

THE ONE-SCALE ATLAS.

MAP VIII.
by Rich[d] A. Proctor

THE SOUTHERN SKIES.

MAP XII.—For SEPTEMBER, OCTOBER, and NOVEMBER.



THE NIGHT SKIES IN THE SOUTHERN HEMISPHERE (LAT. 46° TO 24° S.)
AND THE
SOUTHERN SKIES IN ENGLAND (UPPER HALF OF MAP ONLY) AT THE FOLLOWING TIMES:

At 1 o'clock, morning, Oct. 7.	At 11 o'clock, night, Nov. 7.	At 9 o'clock, night, Dec. 7.
„ 12.30 „ „ Oct. 15.	„ 10.30 „ „ Nov. 14	„ 8.30 „ „ Dec. 15.
„ Midnight, „ Oct. 22.	„ 10 „ „ Nov. 22	„ 8 „ „ Dec. 23.
„ 11.30 o'clock, night, Oct. 30.	„ 9.30 „ „ Nov. 30	„ 7.30 „ „ Dec. 30.

STAR MAGNITUDES.

First . . . . ✸ Second . . . . ✶ Third . . . . ★ Fourth . . . . + Fifth . . . . ▲

THE MAN IN THE MOON.

By Stella Occidens.

"All that I have to say is to tell you that the lantern is the moon; I, the man in the moon; this thorn-bush, my thorn-bush; and this dog, my dog."—*Moonshine in "Midsummer Night's Dream."*

THE myth about the "Man in the Moon" is of great antiquity: how old we know not. Probably it dates back far beyond the time of Moses, for many ancient stories tell of the man who was punished by death for gathering sticks on the Sabbath (Numbers xv. 32–36); and though no allusion is made in the Bible record of this remarkable event to the moon, yet it was generally supposed long before the days of Moses that the unfortunate Sabbath-breaker was sent to the moon, and compelled to stay there for ever thereafter. The story as it stands in the book of Numbers is, of course, simply blasphemous, as it attributes the man's death to the actual command of the Almighty. A well-known German story tells about the man who cut sticks on the Sabbath, and was caught up in the moon, fagots and all, and there stands to this day. Another tale told in Swabia relates about a manikin who stole wood, and is still to be seen in the moon. A Dutch household myth accused the man in the moon of stealing cabbages on Christmas Eve: the neighbours caught him just as he was walking off with a good supply, and they "wished" him up in the moon. He stands there to this day, bearing his load of cabbages. It is said that he turns round once every Christmas Eve; but astronomy does not support the idea. In Sylt, the man in the moon was a sheep-stealer, and it was his custom to entice the sheep with a bundle of cabbages. He was placed in the moon, as an everlasting warning to others.*

In Schaumburg-Lippe, it is said that a man and woman were sent to the moon; the man because he prevented people from going to church on Sunday by strewing brambles and thorn-bushes in their way, and the woman because she made butter on a Sunday.†

Northern mythology tells about a giant who inhabits the moon, and is supposed to cause the ebb and flow of the tide. When he stoops, the water flows; and when he stands erect, the water subsides again.‡ This somewhat resembles the Scandinavian myth about Bil and Hjuki, who were taken up to heaven by Mâni. They were on their way to the well of Byrgir, bearing on their shoulders the bucket Soeg and the pole Simul. They were placed in the moon, and are supposed to regulate her waxing and waning.§ Evidently "Jack and Jill" of our nursery rhymes reproduce this legend. Grimm says that the water-pole of the heathen story has been transformed into the axis-shaft, and the pole into the thorn-bush.

In Hindu mythology the Moon—Chandra or Some—is a male deity, represented in one myth as the son of the patriarch Atri, and in another as arising from the milk-sea, when it was churned by the gods‖ so as to obtain the water of life. The moon is generally represented as wearing white garments, holding a mace in one hand, and riding in a chariot drawn by ten horses and antelopes. The hare is sacred to him, and the Hindus fancy that they see the outline of a hare on the face of the moon.¶

In Africa the man in the moon is supposed to have incurred the wrath of the sun, and is in punishment carved by the knife (that is by the rays) of the latter. This continues until the whole of the moon is cut away, and only a little piece left. The moon implores the sun to have pity on him, and leave this morsel for his children. The sun grants his request, and the moon grows from this little piece until at last it is a full moon. Then the sun begins carving again.*

In China the old man of the moon is known as Yue-lao, and holds the reins of marriages of mortals in his hands. The future husband and wife are tied together by an invisible silken cord, which is only severed at death. Harley remarks, in his funny way, that this must be the man of the honeymoon.†

A Slavonic legend says that the moon, king of night and husband of the sun, falls in love with the morning star, wherefore he was cloven through in punishment, as we see him in the sky. A Russian story is told about a man who sought for the isle in which there was no death. He took up his abode in the moon, but after a hundred years or so had elapsed Death came after him. A furious struggle ensued with the Moon, and the latter proving victorious, the man was caught up in the sky, and now shines "as a star near the moon."‡ It was not an unusual belief that the moon was inhabited: some thought her the place where human spirits either came or went. Others fancied it was a prison cage, in which, behind bars of light, miserable sinners were to be exposed to all eternity as a warning to others.§

Some say the man in the moon is Isaac, bearing a burden of wood for the sacrifice of himself on Mount Moriah. Others that he is Cain, carrying a bundle of thorns on his shoulders in punishment for offering to God the cheapest gift from his field.‖ Dante refers to this in the "Inferno," canto xx., line 123, where he speaks of "Cain with fork of thorns," and again in canto ii. of the "Paradise" he mentions "the gloomy spots upon this body" (the moon's) "which below on earth give rise to talk of Cain." The Jews have a story that Jacob's face is visible in the moon. According to a French superstition, it is Judas Iscariot, who was transported there for his treason. Grimm tells us that a religious superstition is handed down by Berthold, 145, that the moon is Mary Magdalene, and the spots are her tears of repentance.

In Greenland the sun and moon were said to be brother and sister. Malina was teased by her brother Anninga, and she ran away from him. He followed her, but she flew up in the air and became the sun, and her brother, who could not fly so high, became the moon. He is still pursuing his sister, hoping some day to surprise and capture her. "When he is tired and hungry in his last quarter, he leaves his house, on a sledge harnessed to four dogs, and hunts for several days. On his return he eats so much, that he grows into a full moon."

The Australians believe the moon to be a mischievous being, who went about the world doing evil. One day he swallowed the eagle god. The wives of the eagle came up, and the moon asked them where he could find a well. They showed him one, and as he stooped over to drink, they hit him on the head (an idea manifestly plagiarised by Miss Braddon in "Lady Audley's Secret") with a tomahawk, and out flew the eagle.¶

* Harley, "Moon-lore," p. 23.
† Baring-Gould, "Curious Myths of the Middle Ages," p. 192.
‡ Thorpe, "Northern Mythology," vol. iii. p. 57.
§ Baring-Gould, "Curious Myths of the Middle Ages," p. 200.
‖ Hence perhaps the theory that the moon is made of green cheese.—Ed.
¶ *Notes and Queries*, vol. vi. p. 232.

* Harley, "Moon-lore," p. 33.
† *Ibid.* p. 33.
‡ Ralston, "Russian Folk-lore," p. 183.
§ Harley, "Moon-lore," p. 18.
‖ Grimm, "Teutonic Mythology," vol. ii. p. 719.
¶ Andrew Lang, "Custom and Myth," p. 54.

XUM

The moon was not always supposed to be inhabited by a man. Thus a Chinese tale represents the moon Jutho as a beautiful lady, with a double sphere behind her head, and a rabbit at her feet.

> On a gold throne, whose radiating brightness
> Dazzles the eye—enhaloing the scene,
> Sits a fair form, arrayed in snowy whiteness.
> She is Chang-o, the beauteous Fairy Queen.
> Rainbow-winged angels softly hover o'er her,
> Forming a canopy above the throne;
> A host of fairy beings stand before her,
> Each robed in light, and girt with meteor zone.*

In Mangaia, the southernmost island of the Hervey cluster, the woman in the moon is Ina, the pattern wife, who eternally weaves beautiful cloth, *i.e.*, white clouds. Among the South Slavonians the moon is represented in a Servian song as a beautiful maiden, with "arms of silver up to the elbows," sitting on a silver throne which floats on water. A suitor comes to woo her. She avoids him, and sheds tears of anger, wailing with sorrow.† Every reader will remember the Hiawatha legend told by Nokomis:—

> Once a warrior, very angry,
> Seized his grandmother, and threw her
> Up into the sky at midnight,
> Right against the moon he threw her:
> 'Tis her body that you see there.

In the story of Iosco, the moon is represented as an aged woman with a white face and pleasing air, who advanced from behind a hill to greet them. She talks of the sun as her brother.‡

In Polynesia a story tells how the moon came down and picked up a woman and her child during a time of famine. She was working in the evening twilight, beating out some bark with which to make native cloth. The moon was just rising, and reminded her of a great bread fruit. Looking up to it, she said, "Why cannot you come down and let my child have a bit of you?" The moon, indignant at the idea of being eaten, came down forthwith and took her up, child, board, mallet, and all. The people in Samoa still speak of the woman in the moon. "Yonder is Sina," they say, "and her child, and her mallet and board." The same belief exists in the Friendly Islands and the Tonga group.§

A quaint story, told by the Indians in British Columbia to Mr. W. Duncan, relates how a child awaking in the night and feeling thirsty asked its mother for a drink. The mother not heeding, the moon came down and brought the child water from heaven. The child drank some, and was then enticed by the moon to return to her home above. After passing underground till they were clear of the village, they ascended to heaven. There they are to be seen to this day, and the child still holds the little round basket which it had in its hand when it went to sleep.‖

A New Zealand myth tells how in old days, before the moon gave light, a New Zealander named Rona went out in the night to fetch some water from the well; but he fell over something which happened to be in his way, and sprained his ankle. He cried aloud in his pain, and to his great horror he saw the moon approaching him. He caught hold of a tree and clung to it; but it gave way, and fell with Rona upon the moon. Another version says that Rona was falling into a well; he laid hold of a tree, which gave way, and which was afterwards removed to the moon with Rona, where he is visible to this day.

* Harley, "Moon-lore," p. 63.
† Ralston, "Russian Folk-lore," p. 183.
‡ Schoolcraft, "Hiawatha Legends," p. 289.
§ Harley, "Moon-lore," p. 57.
‖ *Ibid.* p. 36.

The Selish race of North-west American Indians have a tradition which Captain Wilson relates as follows:—"The expression of 'a toad in the moon,' equivalent to our 'man in the moon,' is explained by a very pretty story, relating how the little wolf, being desperately in love with the toad, went a-wooing one night, and prayed that the moon might shine brightly on his adventure; his prayer was granted, and by the clear light of a full moon he was pursuing the toad, and had nearly caught her, when, as a last chance of escape, she made a desperate spring on to the face of the moon, where she remains to this day." The Cowichan tribes think that the moon has a frog in it.*

A Buddhist legend relates how Sâkyamunni was at one time a hare. Indra, disguising himself as a hungry beggar, asked for food. The hare offered himself, and as a reward Indra took him up to heaven and placed him in the moon. A Sanskrit legend describes the moon as a watcher of the sky, who sleeps with her eyes open like the hare. The mythical hare is undoubtedly the moon. In the first story of the third book of the Pantschatantra, the hares dwell upon the shore of the moon's lake, and the king has for his palace the moon itself.†

Among the Hindoos and Egyptians the mouse was sacred to the moon. De Gubernatis says:—"The Pagan sun-god crushes under his foot the Mouse of Night. When the cat's away the mice will play. The shadows of night dance when the moon is absent." ‡

AMERICANISMS.

Gerrymander. This word has been already discussed in Knowledge. The term has been used in America since 1811, when during the governorship of Mr. Gerry the State of Massachusetts was so artificially divided up into electoral districts, that the Federal votes were massed together and in large part wasted; while by bringing into effective action Democratic votes which before had been lost in minorities, the Democratic party were enabled to carry everything before them. It appeared on counting the votes returned that two-thirds of the State voted Federal, yet through the artificial distribution of districts, the Democrats secured an overwhelming majority in the Legislature. Essex County, strongly Federal, was so peculiarly divided, that the map presented a ridiculous appearance. Gilbert Stuart, a painter of some distinction, remarked to Mr. Russell, the editor of the *Boston Centinel* (*sic*), that the map looked like some monstrous animal. Carrying out the idea he added a few touches, representing a head, wings, claws, and tail, and being apparently less familiar with natural history than with art, he suggested laughingly that the creature thus adorned "would do for a Salamander." Russell looking at the figure exclaimed, "Salamander! call it a *Gerrymander!*" and ever thereafter, in America, the name of Governor Gerry was associated with that kind of iniquity, though he was probably innocent of all part in the process of dividing up the State, "gerrymandering," of Massachusetts.

Get. A variety of uses of this word, familiar in England so far back as the memory of man goeth, are included by Bartlett among Americanisms—as "get out," used to express incredulity; to "get one's back up"; to "get round"; "to get the wrong pig by the tail"; and "got you there!" But

To get religion is probably purely American. A man

* Harley, "Moon-lore," p. 69.
† Baring-Gould, "Curious Myths of the Middle Ages," pp. 202, 206.
‡ Andrew Lang, "Custom and Myth," p. 117.

in America "gets religion" when he has lost character. After thoroughly losing all semblance of decency, he can start a new character as a penitent, which usually lasts him long enough to get all he wants. The infamous Colonel Chartres used to say that he would give ten thousand pounds for a good character, because it would be worth twenty thousand pounds to him. He lived too early. Had he belonged to these days, and lived out West (for in the East and South this ghastly hypocrisy is almost unknown), he could have done all the renewed swindling he wanted by simply pretending to have "got religion." There is all the difference in the world, be it noted, between a man getting religion and religion getting a man.

To GET THE MITTEN is used in America where in England men speak of "getting the sack."

G'HAL. Having the Bowery *B'hoy* American slang was bound to have also the Bowery *G'hal*. Where the fun of these extra aspirations comes in the dull Englishman fails to see. The B'hoys and G'hals in question are simply Boys and Gals with aspirations—strongly developed aspirations—for beer and skittles candy and chewing gum.

GIMPY. Sprightly. Bartlett remarks that Forby notices the adjective "gimp" for neat, spruce, &c., as provincial in England. Considering that it is found in the classic lines of Burns, "gimp" may be regarded as not wholly unknown on this side of the Atlantic. But "gimpy," though a natural derivative, I have not heard in Great Britain or Ireland.

GIN MILL. A drinking place; much, as we shall see presently, that a preaching place is a gospel shop. In England we have "gin palaces."

GISM. Spirit. Akin probably to the Dutch "geest." It is strange that men found in old times in the breathing or *spiritus*, the breath or *anima* or *pneuma* or *psyche*, the suggestion of soul or spirit. And yet perhaps it was not very strange: for the breath seemed to them the "invisible part of man." The classic languages could find but one word for the Holy Ghost, for the spirit of a man, and for his breath. I suppose the mystery of the invisible, yet manifestly existent breath of a man, led men to regard it as the true spirit or soul, seeing that with its departure life departed also, the soul seeming to pass away to heaven. What would have been thought of any one who had explained in those times the real nature of the breath drawn in and the chemical changes which have taken place ere the breath is breathed out? It would have seemed like a wicked attempt to destroy men's faith in the immortality of the soul. Yet it is strange to think that "in=breathing" should have been accepted as equivalent to "inspiration" in the religious sense, or that men should have found the suggestion of something holy in an *afflatus*, or full breathing. We should find nothing specially suggestive nowadays in "The Holy Wind" (though that is almost the exact equivalent of the Greek for "The Holy Ghost," *Hagion Pneuma*) or in "The Sacred Breath," though that corresponds exactly with the Latin for the same (*Spiritus Sanctus*). We might as reasonably speak of "Holy Oxygen," or "Divine Carbon Dioxide," or "Sacred Sulphuretted Hydrogen." An American means no more when he speaks of "knocking the *gism*" (or gas) "out of any one" than an English boy means when he talks of "knocking the wind out of a fellow."

GIT. This word, which is a veritable Americanism, Bartlett, of course, utterly fails to understand. He says it is equivalent to "go it," of which it may be a contraction. This is sheer nonsense. It is simply "get" mispronounced, just as it always is mispronounced by the vulgar in "forget"; and the only strange thing about the Americanism "git" is its quaint use alone for "get out." The average cockney says "git" as uniformly as the average American cowboy in such expressions as "git up" (generally addressed by the suave coster to his patient Neddy), "git along," and so on. But it is only in America, so far as I know, that any one will say simply "git," as a gentle hint that a man's room is more desired than his company. The hint may be given either with the simple monosyllable "git" or in the form "you git." It is equally an Americanism when the nigger pronunciation "git" is changed to the more civilised "get"; for only in America would "get" or "you get" be regarded as equivalent to "get you gone" or "you get out." They tell in the West, with some natural pride, of a laconic conversation between a miner and a thief (sometimes a farmer takes the miner's place, and a horse thief replaces the thief unadorned—but, anyhow, one man was presumably honest, and the other more or less "on the cross"). The ostensibly honest man sees the thief trying to make his way in to rob, and, holding a revolver at his head, remarks, "You *get*," receiving for reply, as the thief recognises the position, the anti-rhythmic response, "You *bet*."

GIT UP AND GIT. This is a development of the simple "git," somewhat as our English "he's gone and done it" is a development of "he has done it," and as the nigger "he's done gone done it" is a development of that. These redundancies and reduplications characterise the speech of the uncultured, even as among the early Greeks "tetupha" and "tetummai" established themselves as the expressions of very definitely past actions. We might interpret "git up and git" to mean simply "arise and go," were it not applied constantly to cases where no arising is called for or possible.

In the South the expression "git up and dust" is often heard. Here "dust" is short for "make the dust fly," and suggests an even more rapid exit than the simple "git."

TO GIT TO do anything is a niggerism for "getting leave." Bartlett, oddly enough, goes through numbers of examples of the use of "git" which are obviously simple mispronunciations of "get," yet sees no occasion to correct his preposterous explanation of "git" as a contraction for "go it." One might as reasonably imagine that our cockney "forgit" is contracted from "forego it."

GIVEN NAME. As sometimes in Scotland, the expression "Christian name" is commonly replaced in America by "given name." The expression is Puritan in origin; and may probably be traced back to the time when the Christian name was always a saint's name, and superstition had associated each such name with the special influence of the patron saint. Among the Puritans in times before America was colonised, a feeling of dislike, amounting to hatred, had sprung up against such superstitions, as the names in common use among the early Puritans attest. They were "given names." Some of them must have been unpleasant gifts.

TO GIVE OUT, to become exhausted. "Yet did not that widow's cruse *give out*," a Western preacher would say, meaning that the cruse did not fail.

GIVY. Yielding; ready to "give," in the sense of bending easily.

GLADES. The word "glade" of course is English, signifying, when properly used, a bright open place in a forest, where all around is more or less in shadow. In the Southern States this term has come to be applied—quite wrongly at first, though now custom justifies the usage—to grassy tracts covered with water, glades proper being distinguished as "dry glades." The word is akin to "glad," "glow," &c. The wet glades are far from being gladsome places.

G'LANG. If clipping good English makes an Americanism, *G'lang* may be regarded as American for "Go along." Haliburton has somehow associated the contraction with the emphatically Transatlantic address of Sam Slick to his horse, "G'lang, ye skunk, and turn yer toes out pritty."

Go. Making a go of anything, is succeeding in it. Probably the usage is derived from the old-fashioned way of starting a race with the word "go," pronounced so soon as the starter sees that the contestants are on equal terms. A false start is no *go*. In England, oddly enough, we have the negative form of this usage, while we seldom hear the positive form, except provincially. An Englishman will say, "It's no go," who would scarcely think of saying "It's a go."

"Go good," for taste good may be regarded as not less English than American.

"Go a cruise," used for "take a walk or ride," is nautical English, and probably as much used in English maritime counties as in New England, where, indeed, it is almost limited to seaside places.

Go ahead. Although in its verbal sense this is a good old English expression, it is claimed as specially characteristic of Americans to *go ahead*, and used adjectively *go ahead* may be regarded as distinctively American. It is perhaps characteristic of the three great divisions of English-speaking races that our favourite expression in the old country is "All right," while the favourite American expression is "Go ahead," and in Australasia men say "No fear." This triple set of sayings is better than the French aspiration (rather more than satisfied now perhaps) for *la gloire*, or the general submission of Continental nations to military discipline. We English-speaking races find fault with each other, forgetting our kinship; we laud this, that, and the other distinction, often mere tinselling, of other races; but where now, or in the past of the world, has any race, regarded collectively, made a deeper mark in the history of the world? What other race, or set of races, has ever so definitely acted on the triple principle, or has so thoroughly justified it — See that all is right, then go ahead, and fear not. Despite the savagery shown too often by British Buncombe, by American spread-eagleism, and by Australian assertion of "Australia for the Australians," the English-speaking races have always shown (on the whole) the sense of duty expressed in our British "All right," the aspiration for progress expressed in the American "Go ahead," and the confident but unboasting courage expressed by the Australasian "No fear."

To Go back on. This peculiar expression for turning against, or forsaking any one, must surely be an Americanism. I have never heard it in any part of Great Britain, nor have I ever met with any one who had. Even in America the expression is not general. It is Western, or rather, had its origin in the West. Every English reader remembers the humorously pictured perplexity of the clergyman from the East, when told that the defunct miner "Never went back on his mother." I imagine, but without a particle of authority for the supposition, that the expression was first used by teamsters, and was suggested by the going back of a waggon on a steep slope unless blocked. Such experiences must have been common in the old waggoning times out West, in the mining region of the Rocky Mountains. Virgil evidently had some such idea in his well-known description of the oarsman pulling against stream. He says he has seen things *go back on* the labourer—

> . . . *retro sublapsa referri;*
> Non aliter quam qui adverso vix flumine lembum
> Remigiis subigit, si brachia forte remisit,
> Atque illum in præceps prono rapit alveus amni.

Photographs of the sun were taken at Greenwich Observatory on 199 days during 1886, while photographs from India filled in the gaps for 164 days, so that the record of observations is complete for all but two days. The area of sun-spots and faculæ has continued to decline during 1886 and 1887. There were sixty-one days in 1886, and from October to April 17 last, seventy-three days on which no spots appeared.

STRANGE CHANCES.

THE question of the occurrence of unusual events, such as that considered in the article, "A Perfect Innings at Cricket," last month, when only a sufficient number of trials is allowed, leads to some of the commonest difficulties in regard to matters of chance. Indeed, one may say that the very elect are apt to be deceived in such matters—meaning here by the very elect, mathematicians themselves.

It is noteworthy, indeed, that problems in chance are very apt to deceive mathematicians whose researches have lain in other directions. A well-known example of this is the case of d'Alembert, when the very simple problem was propounded to him, What is the chance of tossing heads once at least in two trials? He replied, and not hastily, but after careful study of the matter, "Two in three, or the odds are two to one in favour of success." In reality, the chance is three in four, or the odds are three to one in favour of tossing one head at least. Yet d'Alembert's reasoning seems at first sound, and was long held by him to be unanswerable:—There are three possible events, viz., both tossings may give head, or both may give tail, or one may be of one sort, the other of the other; of these three events only one is unfavourable; since, then, two out of three events are favourable and one not, the chances of success are two out of three, and the odds in favour of success are two to one. The error lies in omitting to notice that one of the three events is twice as likely as either of the other two; for while we can only get two heads in one way, and two tails in one way, we can get a head and a tail in two ways; viz., first tossing head, second tail, or first tossing tail, second head. There are, in fact, four possible events, viz., head, head; head, tail; tail, head; and tail, tail: and *these four are equally likely.* Wherefore, since only one is unfavourable, the chances are three in four for success, or the odds against failure are three to one.

The words italicised are those which in every such discussion of a chance problem must always be represented; that is, the question of the probability of the different kinds of result must always be considered as well as their mere number.

But this problem of d'Alembert's might be treated like our cricket problem; and for my own part I prefer always that more general way of treating such problems. Thus the real question is, What is the chance that "tail" will be tossed at both trials? Now the chance at each trial is clearly one-half, hence the chance that both trials will give a "tail" is a half multiplied by a half, or one quarter; that is, one in four, or the odds are three to one against this happening.

If we dealt in this way with the probability of tossing head once at least in twenty trials, we should find it to be 1,048,575 out of 1,048,576, or the odds against tossing always tails (or always heads) in twenty trials are 1,048,575 to 1.

But it is in watching, or thinking about, a great number of trials, that errors are most commonly made. The laws of probability assure us that if a thousand millions of trials were made, there would be nearly a thousand cases in which "heads" would be tossed twenty times in succession—each trial being independent, so that as soon as a "tail" appeared the trial would be concluded, and a fresh one have to be begun. And further, the laws of probability assure us that, although on the average there would be only one such marvellous run of heads in 1,048,576 trials, yet the chance of tossing twenty heads in 1,048,576 trials would be more than one-half, or the odds would be in favour of such an

event. (About three-quarters of a million of trials would give an even chance.) But if an experiment is commenced, and after long and wearisome series of trials—say, few thousand—no such series should appear, as is exceedingly likely, then the experimenter would argue that, since by the laws of probability the unsuccessful trials already made can have no effect on the results of future trials, we are no nearer success than at the beginning. Another series of 10,000 trials might be carried out with similar want of success, and another, and yet another—a hundred such trials taking us to a million: if all these were similarly unsuccessful, and there is no reason why they should not be, we should be as far from success as at the beginning. Going on in that way would be useless—it would seem—or, in other words, the laws of probability have in this case misled us.

The fallacy of all this lies in the assumption that that which is likely is sure to come off. If we fail in 10,000 trials we may equally fail in the next, and the next, and so on. But inasmuch as we have about one chance in 100 of succeeding in 10,000 trials, whereas at each trial we have but about one chance in a million, we must not treat a chance of the former sort as if it were no greater than a chance of the latter. And to bring the matter down to the test of manageable experiment—it is almost certain that in 10,000 trials there will occur one case at least of thirteen successive "heads"—this has been tried, apart from the numerical considerations which show it to be certain.

Imagine, then, 80 trials of this kind, giving almost certainly about 80 runs of 13 heads (for if some gave none, these failures would be made up for by others which gave two or more such runs). Here, then, are 80 cases of 13 heads in succession to which we may limit our attention, for no shorter runs can have any bearing on our attempt to get 20 successive heads. We may regard the continuance of these 80 trials—to see how many more heads there may be—as if they were fresh trials. Now it would not be thought a very wonderful thing if in 80 trials we obtained a run of seven heads, which with the thirteen already given would be the 20 heads required. Hence this reasoning based on actual experiment shows that in 800,000 trials there is a good chance of tossing 20 heads in succession, wonderful though such a series may be, and incredible though it might seem during actual experiment on so wearisome a scale that any good could result from going on with the tossings.

It must be remembered in all such cases that success may come off at the first trial, and is quite as likely to come off at that trial as at any other. It is this circumstance which causes the answer to the famous Petersburg problem to be so seemingly monstrous:—How much should be paid, asks that problem, for the privilege of tossing a coin and receiving 2*l.*, 4*l.*, 8*l.*, 16*l.*, or so on, always doubling, according as you fail to toss head at the first, second, third, fourth, &c., trial. The true answer is that no sum, however large, will fairly represent the price you should pay. You have but one trial, just as in a lottery you may have but one ticket; but the number of prizes is infinite, and you *may* draw one of the biggest in your one trial. According to the laws of fair lotteries, you must pay for your chance of getting each ticket. Thus you must pay 2*l.* for the chance—equal to certainty—of getting the smallest prize at least; you must pay half of 4*l.*, or 2*l.*, for your chance (one-half) of getting the 4*l.* prize; you must pay one-quarter of 8*l.*, or, again, 2*l.*, for your chance (one-quarter) of getting the 8*l.* prize; and so on, always the same sum of 2*l.*, for your chance of getting the 16*l.* prize, the 32*l.* prize, the 64*l.*, 128*l.*, and so on for ever. Hence you ought to pay, if you should have such wealth, an infinite number of sums of 2*l.* This sounds like nonsense, because if you have unlimited wealth it would be far better to keep it. Yet the answer is right, regarded merely in its numerical aspect; for the sums you have the chance of winning are enormously greater, one may say infinitely greater, than the sum you are risking, let it be what it may.

The lesson really taught by the Petersburg problem is the folly of the gambler's notion that his chance of winning a stake represents its actual value to him. We see at once that a man must be an idiot who would pay, say, 10,000*l.* for a chance in such a lottery as is described above, though the actual value of his chance is very much greater. But a man of the gambling type does not hesitate for a moment to regard a ticket out of 200,000, where the prize is 200,000*l.*, as worth not only 1*l.*, its mathematical value, but much more—he will gladly pay three or four pounds for such a ticket, which, regarded as property, is worth much less even than the 1*l.* which represents its due proportion of the great prize.

The readiness, too, with which many will buy tickets in a lottery, and their unwillingness to buy a chance in any such venture as the Petersburg problem, shows how little men realise the meaning of large numbers. A gambler begins to see what he is doing when tossing is in progress, the first "tail" (let us suppose) to limit the amount of his prize. But when he hears of a scheme like the Louisiana Lottery, in which there are a hundred thousand tickets, he buys his ticket with the vaguest idea as to what such a number really represents. If it could be pictured to him in a suitable diagram, or if he could be shown a heap of grain in number equal to the number of tickets, and recognised one only among all these as representing his chance, he would probably think twice before investing his money on so precarious a venture. But as matters are, a certain air of mystery hangs over the event: something occult seems involved; in such sort that superstition comes in to suggest that by noting omens or dreams, or by venturing on some specially selected number, he will have a better chance of winning than that mere 100,000th, or one-thousandth, or whatever it may be, which the laws of probability assign to him.

There are other points in regard to which the ways of the gambling community are interesting, not to say amusing and unreasonable. The regular gambling fraternity, those who make a business of it, are apt to express contempt for the way in which the verdant gamblers whom they despoil aim always at getting a great prize for a small risk—as in buying a lottery ticket, backing the favourite, and so forth. They themselves, however, are quite as unwise in their systematic gambling, and would lose in the long run quite as much if they limited all their ventures to fair ones. One can lose a fortune, for example, quite as readily by always laying the odds as by always taking them, if the true odds are equally followed. It is only because laying the odds gives the bookmaker a better opportunity to bet on unfair terms that in the long run he always comes off best, while, in the long run, the backers of favourites are brought invariably to ruin. But the bookmaker falls into the mistake of supposing that in the system of laying odds against events more or less unlikely to happen—and generally even the favourite horse in a race is more likely to be beaten than to win, though more likely to win than any other individual horse in the race—there is safety, and not only safety, but the assurance of success and wealth in the long run.

It is for this reason, probably, that while we find the inexperienced pigeon seeking always some such way to wealth as the purchase of a lucky ticket in some great lottery, or backing horses at long odds and winning, the more practised gambler of the rook species is the victim of a delusion

opposite in character, but as fatal in its effects, unless corrected by devices not depending on chance—faith in gambling systems, or what are sometimes called martingales.

These systems, some of which I have described elsewhere, are singularly illusory. To study their working, not only as given in detail by a believer, but as carried out again and again in practice, they seem practically perfect. In every case, the plan is guided by the gambler's actual loss and gain; when he has lost he wagers somewhat more at the next turn than before his loss; when he has gained he wagers somewhat less, the actual difference depending on the particular system employed. But always after continuing the system long enough, it results, unless there is an improbable run of bad luck, that the losses are all cleared off, and a certain sum, the same in every trial, is secured. It can be shown, not only vaguely as by the believer in the system, but by mathematical demonstration, that the chances are greatly against failure to secure this definite sum, in any given trial of the system. Theoretically, indeed, if the gambler's pocket is but long enough, and the limit put by the bank on stakes is high enough, the process is certain to end in the gambler pocketing his 10*l.* or 20*l.*, or whatever the amount he assigns at the outset for each trial, may be. So he may go on winning twenty, thirty, forty, perhaps a hundred times in succession, to the envy of all those who are not acquainted with the plan on which the system is worked. He may improve the system until he might get a thousand successes for one failure. Thus faith grows in such a system until the gambler assures himself that he has the secret of securing unlimited wealth. Yet, all the while, every step of his career is towards ruin.

The trouble lies here:

The surer the method of the system the smaller is the sum made at such small risk as remains on each trial. This circumstance is disguised by the fact that the risk arises not only in each trial regarded as a whole, but in the progress of each trial. For instance, the trial having begun and gone unfavourably for several steps—which is always likely enough—the risk that a fatal run of luck will occur before the losses are wiped off is now very much greater than it was at the beginning of that trial. Or if, after all has gone well at first, a run of bad luck comes, then, though the player is no worse off as to risk than at the outset, he has lost all the benefit of the run of favourable luck, and is situated as if starting on a fresh trial. The gambler blinds himself to this, though every stake his system calls on him to deposit should remind him of it; but in reality this is where the danger chiefly lies. For the rest, it is easy to see that the high probability there always is of winning at any given trial affords no assurance against loss. If a man A says to another, B, you shall draw again and again from this urn, in which—as you can see and count—there are one thousand balls all white except one, which is black, replacing the drawn ball after each trial, and every time you draw a white ball you shall pay me 1*l.*, while every time you draw the black one I will pay you 1,000*l.*, A would be most likely to have a long series of successes before he had to pay 1,000*l.* Yet in the long run A would not be likely to gain by such a venture, and he might lose very heavily. If he agreed to take only 18*s.* from B at each drawing of a white ball—which would correspond with the position of a gambler working out a system at a public gaming-table—he would be sure to come off second best, if he only continued long enough.

And that is actually the way with all such systems. They are pretty sure to work successfully many times before there comes the run of luck on which they fail; but that run is quite sure to come long before the gambler has made as much by the system as will repay him for his time, trouble, and worry; and each failure will, on the average, sweep off more than the previous successes have secured in the way of gain.

THE NATURALIST'S LABORATORY.

CONTRIBUTION VIII.

Laboratory Requisites.

THERE are many things which add very materially to the comfort of the student, and convenience in the prosecution of his studies, that have never been discussed in any systematic treatises, but are nevertheless of the first importance, since they usually draw the line between slovenly and neat work in the laboratory.

Preserving and Macerating Pans.—It is well known that the dissecting-rooms of most of our universities and colleges are remarkable for their pestiferous atmosphere. Where human anatomy, or the structure of animals much over the size of a rabbit or cat is taught, this undesirable state of things can be minimised by careful previous treatment of the "bodies" and "parts" in question; but it cannot be wholly subdued without enormous expenditure and unnecessary labour. In ordinary biological laboratories and in private rooms however, anything of the kind above alluded to ought not to be tolerated, especially as nothing much larger than a cuttlefish or a cat need be dissected; and most of the large firms of potters, such as Doulton & Co., of Lambeth, and others, manufacture glazed earthenware pans, with suitable, closely-fitting covers, of various shapes and sizes, for manifold uses in the household and kitchen—*e.g.*, ham pans, rinsing red pans, &c. The animal under operation should be wrapped in a calico cloth well wetted with strong methylated spirit, and then immersed or partially submerged in diluted spirit in the pan, during the intervals between work. Where no suitable cover is provided with the pan a piece of window glass cut approximately to its shape may be used, and total exclusion of air, for even a protracted period of time may further be secured by a liberal use of hog's lard, after the fashion of a cement. Twenty such vats in a private room cannot, under such circumstances, pollute its atmosphere, or prove otherwise offensive. Similar vats without covers are decidedly preferable to wooden tubs for macerating work, which, it need scarcely be remarked, ought always to be conducted out of doors, or rather, in a special outhouse or shed.

The Dissecting Dish, as its name implies, is useful for animals of small size only, such as earthworms, snails, frogs, &c. Although an ordinary pie-dish can, and has, largely been used for this purpose, it is unquestionably a very imperfect article. Let us take, for example, a frog: to learn its anatomy thoroughly, several days of work should be spent upon its dissection. The dish should be filled to the depth of about an inch and a half with a suitable mixture of paraffin wax and hog's lard melted together at a low temperature, and poured, whilst still fluid, but on the verge of becoming solid, into the dish; this will prevent any marked after-shrinkage. The animal should next be fastened upon the paraffin when solid, with pins, and covered, or partially covered with dilute spirit. After a day or two, when some critical portion is about to be examined, the student often finds, to his chagrin, that the liquid around his dissection has insinuated itself between the sides of the dish and the edges of the paraffin bed, by an almost imperceptible shrinkage of the latter, sufficient, however, to render it so

unsteady as to preclude the possibility of work, except with the utmost difficulty. To obviate any such mishaps the author has devised a dish, shown in section at fig. 1. It may be oval or oblong (preferably the latter) in shape; its

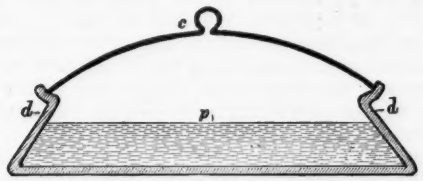


Fig. 1.—Dissecting Dish.
c. Cover; *d*. body of dish; *p*. bed of paraffin. (*Sectional Diagram.*)

sides slope upwards and inwards, and thus effectually prevent the bed of paraffin from shifting or floating during the dissection. The upper rim of the dish should be indented, so as to admit of a cover which will not easily slip off. Both dish and cover may be made of earthenware, of indurated wood, or the new paper-bottle material invented by Mr. H. L. Thomas, of Chicago, and now being introduced into this country by Messrs. Tulk & Co., of Walbrook.

Museum Bottles.—One of the greatest difficulties experienced by museum curators has hitherto been in the display, to the fullest advantage, of preparations in spirit. However carefully these are put up, the time arrives, sooner or later, when it is found necessary to readjust the object or to renew the spirit, either on account of evaporative deterioration or discoloration of the fluid. The bottles are necessarily expensive, and those of large sizes usually have to be made specially to order—of such, those with

Fig. 2.—Patent Lock-Stopper, suitable for Museum Bottles.

evenly ground tops, over which are fastened circular discs of glass, by means of a more or less spirit-proof, colourless cement, are mostly in vogue, and there certainly is an advantage in the clear transparent top, which admits light, and thus shows every part of the structure displayed to the best advantage; yet the drawbacks are considerable, *e.g.*, the cases in which they are placed may, and often do, overshadow the transparent tops, which are, moreover, liable at all times to become detached, or, on the contrary, are found inseparably fastened, when it is extremely desirable to gain access to the preparation. All these objections have been overcome by the invention of the "Patent Lock-Stopper," now being manufactured on an extensive scale by a Limited Company, whose headquarters are at 57 Moorgate Street, London, E.C. The stopper has never yet been applied to the purpose above mentioned, but is chiefly used for chemicals, pickles, preserves, condiments, &c. It consists of a metallic cap, upon the upper surface of which (see fig. 2) there are two nearly semi-circumferential inclined ridges. A metallic bar, with downwardly projecting catches, which slide into the grooved neck of the bottle, is fastened to the centre of the upper surface of the stopper by a pin or axis, upon which it can rotate horizontally; so that when the stopper is made to slide side-wise upon the neck of the bottle, and the bar is turned round so as to pass up the ridges, on the edges of the upper surface, as shown in fig. 2, the stopper becomes very firmly attached to the bottle. The under surface is provided with a yielding pad of material which is spirit, acid, and oil-proof, and when properly adjusted makes a perfectly air-tight joint. To remove the stopper at any time, hold the bar as shown in the engraving, turn it down the incline, and *slide* the stopper off; to replace it, hold the bar, as in the figure, slip both ends into the groove round the neck of the bottle, slide the stopper into its place, and screw the bar up tightly. Specially-made bottles of any size can be provided with stoppers such as that described above, at a cost not much in excess of that charged for common corks.

The next contribution will conclude the subject of laboratory requisites, and pass on to a consideration of instruments and their uses.

VARYING ASPECTS OF THE EARTH'S GLOBE.

IT is often convenient in astronomical study to consider the apparent aspects of the latitude-parallels and meridians of a globe such as PeP′e′ (fig. 1), rotating about an axis a*O*a′, to which the polar axis, POP′, is inclined. Suppose the rotation such as (at the commencement of rotation) to bring P *towards* the observer, from its position as shown on the edge of the globe—the observer's distance being supposed very great compared with the dimensions of the globe.

Let us first consider certain properties which will aid in the consideration of these effects, and then exhibit an illustration of the method of construction by which the meridians and parallels of the globe after any given rotation around a*O*a′ may be laid down.

First, every point on the *globe* PeP′e′ or within it describes in reality a circle around the axis a*O*a′, in a plane at right angles to that axis. Seen, therefore, from a distant point of view so placed that the line of sight to O is at right angles to the *circle* P eP′e′, any point on or within the globe (supposed for the moment to be transparent) will appear to travel backwards and forwards in a line parallel to *t* O t′, moving from right to left in the nearer half of its course, and from left to right in the farther part.

Secondly, the rate at which such a point would appear to move in different parts of its line is very easily determined. Take, as an instance, the point P, and draw P o p at right angles to a*a*′. Then the line P o p is that along which the point P would appear to move backwards and forwards. But we know that in reality the point P is describing a circle, of which P o p is the projected view. Suppose this circle opened out by being rotated about the diameter Pp—into the circle PRpR′. Then, if the points 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 are equidistant points around the circumference of PRpR′, it is quite clear that the uniform rotation around a*O*a′ will bring the point P to the apparent position, q, r, o, s, u, p, u, s, o, r, q, P (obtained by drawing the lines 1—11, 2—10, 3—9, &c.), after successive equal intervals of time. We

have precisely the same construction for any point whatever, either on or within the globe. The point n, for instance, moves to n′ and back to n, at a rate exactly proportional to that at which P moves to p and back to P.

Thirdly, every line through a*O*a′ describes a double cone about a*O*a′. The figure of this double cone for the line POP′ is shown; and it is clear that not only would it be as easy to show the cone for any other line through O, but also for a line through any other point in a*O*a′. For instance, the *line* c c′, which crosses a*O*a′ at a point near R′, describes a double cone, of which this point is the vertex, and of which the upper is the lesser portion. The line a a′ describes a simple cone of which a is the vertex. *Finite lines which would have to be produced to meet* a*O*a′ *produced*, describe only *frusta* of cones; but, mathematically speaking, we say that every line through any point of the line of which a*O*a′ is a part, describes a double cone around this line as axis.

Fourthly, bb′, aa′, cc′, tt′, &c., represent circles around the axis POP′, that is, they represent latitude-parallels. having this line for major axis, and touching the lines e e and e′e′, the outline of the equator is determined to be that shown in fig. 2. In this case E e′E′, fig. 2, is the nearer part of the ellipse, the lighter half of the ellipse lying on the farther half of the globe, supposed for the moment to be transparent: but if we had supposed the rotation to have been through an angle Po10 (not the acute angle, but the angle measured by the arc PRp10), we should have obtained the same shape and position for our ellipse, only the lighter part would have been on the nearer half, and Ee′E′ on the further half.

The case of a latitude-parallel is just as easily examined. Take the parallel c n c′, for instance. When P is at r, n, the centre of the parallel, is at *n*, and a line through *n* at right angles to r r′, equal in length to the *line* c c′, and bisected at *n*, is the major axis of the ellipse representing the latitude-parallel c c′. Further, c will be the point farthest from, and c′ the point nearest to the *plane* t*O*t′, throughout the rotation we are considering; and the ellipse will therefore always touch the lines c c, c′c′, figs. 1 and 2. If, therefore, in fig. 2 we

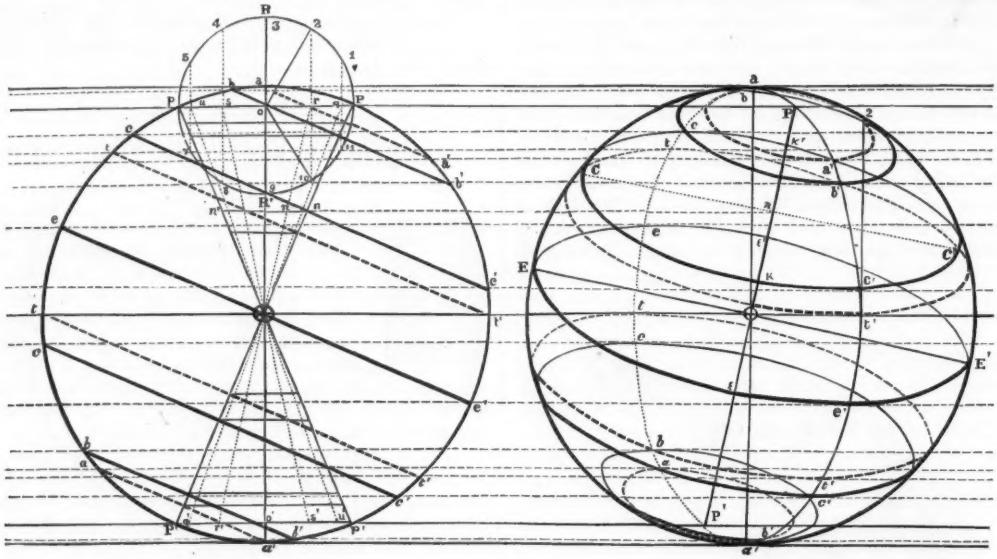


Fig. 1.

Fig. 2.

Let us examine into the apparent shape of the ellipses into which these circles are projected as the rotation we are considering goes on. Take first the equator, represented by e *O* e′. The points e and e′ are those farthest from the plane t *O* t′, and it is obvious that they will remain so throughout the rotation. Therefore if the lines e e, e′e′ are drawn parallel to t *O* t′, the ellipse representing the equator must always touch these two lines. Further, since it is easy to find the positions assumed by the points e and e′ (by following the plan already described for P) for a given amount of rotation, we immediately find the points at which the ellipse touches the lines e e and e′e′. It is also obvious that the greater axis of the ellipse cannot but be at right angles to the polar axis of the globe, and we have seen how the position of this axis is determined. Suppose, for instance, that the rotation around a*O*a′ has taken place through an angle equal to the angle P o 2, then the north pole has come to r, and the south pole to r′, therefore r *O* r′ is the position of the polar axis. If, then, in fig. 2 we draw POP′ in this position, the line E*O*E′ at right angles to POP′ is the major axis of the ellipse representing the equator. And as it is easy to draw an ellipse take *n*, determined by drawing *n* n *n* parallel to OO, to meet PP′, fig. 2, and take CC′ in fig. 2 equal to cc′ in fig. 1, at right angles to PP′ and bisected in n, an ellipse, Cc′C′, having CC′ as greater axis and touching the lines c c, c′c′, represents the latitude-parallel required.* The part Cc′C′ is the nearer, and it is clear that more than one-half of the parallel lies on the hemisphere turned towards the observer.

In this way every latitude-parallel is determined. The parallel a a′ presents a peculiarity worthy of notice. Since this parallel has upon it a point, a, which is the uppermost point of the globe, and since this point cannot but remain uppermost throughout the motion, the ellipse representing this parallel always appears to touch the outline of the globe's disc in the point a.

* It is easily seen that the points of contact of all the ellipses with their corresponding pairs of parallels lie on the ellipse a t′*a* t (fig. 2); since these points of contact, originally lying on the circle to a e′*a*′e, must be brought by the rotation of this circle around a*O*a′ lie on an ellipse having a*O*a′ as axis, and passing through the points P and P′. Also it is obvious that the minor axis t*O*t′ of the ellipse a t′*a* t is easily determined by taking the angle a*O*2, equal to the angle Ro2 (fig. 1), and drawing 2 t′ parallel to PP′.

I proceed to give a brief description of the geometrical processes involved in the construction of the figures of plates i. to xiii. of my "Seasons Pictured," conceiving that these processes may have an interest for the mathematical reader.

Describe a circle, aPa' (fig. 3), to represent the outline of the disc, and take the angle aOP, equal to the obliquity of the ecliptic (or nearly 23° 30′). Draw Po at right angles to aO, and describe the arc PL with centre o and radius oP. On this arc take the angle PoL, equal to the angle described by the earth around the sun from the vernal equinox, at the moment considered. (For instance, for the five sun-views one month after the equinox in my "Seasons Pictured" the angle would be 30°; for those one month before the Midsummer solstice the angle would be 60°; and so on.) Then LP, drawn at right angles to oP, gives P the pole of the earth. Thus POP' is the polar axis, and EOE′ at right angles to POP' is the major axis of the ellipse which will represent the equator. The half-minor axis Oϵ is equal to LP.*

To describe an ellipse, having given axes, is a very simple matter. Since it is necessary, for our purposes, that we should have *longitude-circles* as well as *latitude-parallels*, the following method, which gives points of both curves at once—that is to say, gives the points where the longitude-circles and latitude-parallels we wish to draw, intersect—is the most convenient:—

A circle, of which ϵM is a quadrant, is described round O as centre with radius equal to PL. The quadrant Ep' is divided into three equal parts in e_1 and e_2; and lines are drawn from O to these points, meeting the quadrant ϵM in f_1 and f_2. Then lines $e_1\epsilon_1$, $e_2\epsilon_2$, parallel to PP', and lines $f_1\epsilon_1$, $f_2\epsilon_2$, parallel to EE′, give by their intersection the points ϵ_1 and ϵ_2, on the ellipse representing the equator, and *also* on the longitude-circles we require.

To determine the ellipse corresponding to another parallel originally appearing as the line cnc′, a very similar method is available. The line nn parallel to Po gives the point n on OP, which is the centre of the ellipse we require; CnC′, equal in length to cc′, and at right angles to (and bisected by) PP', is the major axis; and since it is clear that this parallel, being (as its name implies) parallel to the equator, must be opened to exactly the same proportional extent, we get the half-minor axis $n\kappa$ by drawing the line Cκ parallel to Eϵ. Describe circles of which CG and $l\kappa$ are quadrants, and divide the quadrant CG into three equal parts in 1, 2, as in the former case; then, the lines n 1 1, n 2 2, being drawn, the lines through 11 and 22 parallel to the axes give the points κ_1, κ_2, on the ellipse and also on the longitude-circles we require. The quarter-ellipses Cκ, Eϵ, and the arcs $\kappa_1\epsilon_1\gamma_1$, $\kappa_2\epsilon_2\gamma_2$, of the two ellipses representing the longitude-circles we require, may now be drawn in: and by carrying on this process for other latitude-parallels and longitude-circles we get the comp'ete sets of lines shown in the figures of my "Seasons Pictured." The quarter-ellipses ϵE′ and κC′, the portion of an ellipse $I\kappa'I'$ beyond C and C′, and $\kappa_3\gamma_3$, $\kappa_4\gamma_4$, parts of longitude-circles crossing these, are added to show the relation of that part of the construction which has been gone through to the complete figure. It will be gathered that the construction of the figures of my "Seasons Pictured" has involved some degree of care and labour—a point which I only mention because those figures have been spoken of as if they had been drawn freehand.

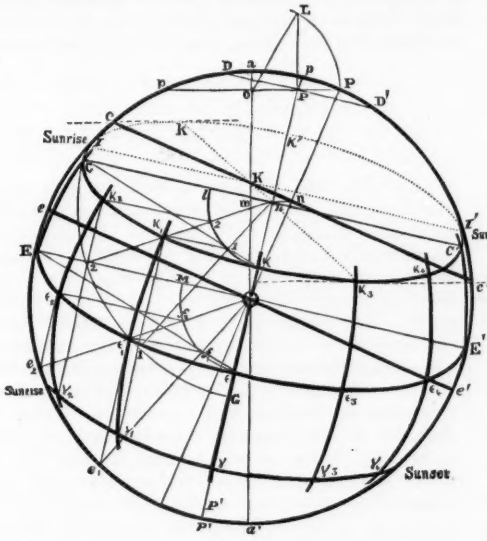


FIG. 3.

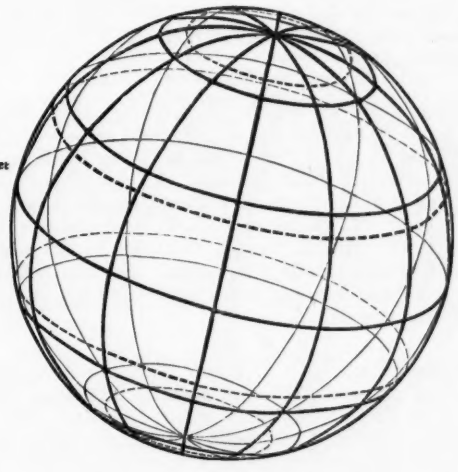


FIG. 4.

Of course, the careful construction of the ellipse CκC′κ' would give correctly the points I and I' in which this ellipse meets the circle aEa'E′—points corresponding to the place of sunrise and sunset for places on the latitude-parallel CC′. But it is well to determine these important points by a construction founded on the following simple considerations. Since it is clear from what has been said about straight lines passing through aOa' that the plane of the latitude-parallel cc′ (fig. 1) always meets Oa in the same point K (fig. 3), and since the line of intersection of this plane with the *plane* aEa'E′ must be parallel to the line EOE′ (which is the intersection of the plane of the equator with the plane aEa'E′), the line IKI' parallel to EOE′ is

* This is easily shown; for the globe may be supposed to have assumed its present position (with $PO'P'$ for polar axis) by having been rotated about EOE′ in such a manner that P moved along the *arc* pP (the foreshortened view of an arc eqnal to pD′ or pD obtained by drawing DPD′ at right angles to OP). By this motion the equator, originally seen as a line EOE′, would open out into the ellipse EϵE′, and, since the *arc* Oϵ would necessarily be the same as the arc pD, the *line* Oϵ would clearly be equal to PD. But PD is equal to PL, since (by Euc. III., 3) the square of either of these lines is equal to the rectangle pP,PP.

the line of intersection of the latitude-parallel c c′ with the plane a*E*a′E′; and the points *I*, *I*′, thus determined are clearly those we require. For only that part of the latitude-parallel CC′ which lies on the nearer half-globe can be visible, and the circle a*E*a′E′ separates the visible from the invisible hemisphere.

Fig. 4 is added to show the appearance of a transparent globe traced with latitude-parallels and longitude-circles, and presented in the same way as fig. 2, which is also the presentation dealt with in the constructions illustrated by fig. 3.

Gossip.

Readers of Knowledge are requested to alter the words "It is" at the beginning of the foot-note on p. 227 of the August number into "Is it," altering the full stop after "folio" into a note of interrogation. "Benvolio" suggests in that note the possibility that, after all, the passage regarded as unmistakably corrupt may be as Shakespeare wrote it, and that Mrs. Quickly actually said, "his nose was as sharp as a pen and a table of green fields." Put it the other way, says "Benvolio," and it has as much sense in it as most of the things said by Dame Quickly have: "his nose was a tablet of green fields and as sharp as a pen." The reading, "a babbled of green fields," would be better for a Desdemona than a Dame Quickly.

* * *

Another mistake, for which my writing was, I fear, responsible, occurs near the end of the fourth section of the August "Gossip," where "the familiar Peter Williams" replaces "the familiar Peter Wilkins." I know of no Peter Williams, and therefore to me, at any rate, the name is not familiar. Peter Robinson and Jack Robinson are as familiar as Peter Wilkins, though not quite in the same way, while Robinson Crusoe is as familiar in a very similar fashion. But Peter *Williams* is as much out of the way as *Robertson* Crusoe would be.

* * *

I have received from Mr. J. Fraser a copy of his pamphlet noticed at page 236, with a letter indicating the author's belief that the notice is unfair. That the notice is intentionally unfair, I can most emphatically deny, for though I did not myself write it, I know the author, and that he is incapable of the deliberate injustice imputed to him. I had myself only glanced over Mr. Fraser's pamphlet, and had come to the same conclusion as the notice indicates, viz., that Mr. Fraser suggests "heat" as the true explanation of gravity, an idea which led me to close the pamphlet with the remark, "*That* won't do." For we know the rate at which heat travels, and this velocity is quite insufficient to account for the instantaneous transmission of the action we call gravity, while also, though Mr. Fraser may have conditioned that heat shall not act in the proportion of sectional area, heat could not fulfil Mr. Fraser's condition, but must act as the notice of his pamphlet said. If I can find time to peruse Mr. Fraser's pamphlet (I use the word "peruse" here instead of "read" of set purpose), and can find that he really does guard his theory against the objections mentioned in the notice, I will state as much very willingly in these columns. But, in the meantime, I would beg Mr. Fraser to dismiss the notion that he has been treated with wilful unfairness.

* * *

I do not know what particular form the explanation of gravity took in Mr. Kedzie's book mentioned in the notice of Mr. Fraser's, but, from the account, it is the old old explanation, according to which, particles travelling with infinite velocity in all directions fall on bodies except where shielded off by other bodies, and this again emphatically will not do. If gravity is to be explained at all, it must be by some form of energy transmitted from every particle of everybody's mass, with a rapidity incomparably exceeding the velocity of light.

* * *

Space compels me to keep "Gossip" within very narrow limits this month. I shall invite the attention of readers of Knowledge, however, to the announcement which appears in slip form among the advertisements. It will be observed that the book on astronomy there announced will be very much larger and more fully illustrated, in proportion to its price, than any book of the same class yet published. But I can promise that it will be larger still and more fully illustrate if an adequate number of subscribers should justify the additional expense. I have long regarded it as a mere farce, and an unfair one at that, to offer for 31s. 6d. a book of only some 600 ordinary octavo pages, even though the name of an observatory astronomer is on the title-page, who, if earning his salary, cannot possibly have had time either for the reading or for the independent researches necessary for the production of an original treatise on general astronomy.

Reviews.

Anything that reaches us from the pen of Dr. Geikie must be good, and his last little work only emphasises this fact. *The Teaching of Geography* (Macmillan, 2s.) is an introductory essay prefacing a series of manuals in that subject promised by that enterprising firm. The book is intended directly for teachers, and only indirectly for the pupil. It systematises in Professor Geikie's masterly way the methods by which the subject may become a valuable educational instrument. It is a work much needed; whether it will succeed is another question, which we should hesitate to answer in the affirmative quite so readily. The great majority of schoolmasters outside the class of elementary teachers hardly know how to teach at all. As Dr. Abbott observed recently, a brass plate, and a preliminary failure in some other occupation, with, perhaps, the easily obtained but imposing letters M.C.P. or F.R.G.S., form to them a sufficient stock-in-trade. Still, there are some teachers really in earnest in their work, to whom geography is not topography only, and we cordially invite them to peruse this book. In skilful hands the subject may be made a capital training for the young. The large class of young elementary teachers studying at college and elsewhere how to do their work will doubtless use the book in their course. It will unquestionably improve their knowledge of method.

Greek Verbs in a Fortnight, by John Carey, B.A. (Swan Sonnenschein & Co., 1s. 6d.), is a fairly successful attempt, by tabulation and generalisation, to shorten the time usually wasted in learning the Greek verb. We think it likely to be of use to older boys rather than to young pupils.

The *Exercises in Word Formation and Derivation*, by Frank Ritchie, M.A. (Sonnenschein), if time would allow of its use in schools, would infuse a little useful variety in the English grammar lesson. Word-building is one of the best mind-expanding processes, especially with young pupils. They enter into it with immense interest, and retain much. The exercises upon derivation from the Latin and Greek would suit older boys who have begun the study of those languages; but for those who have not, we think time might

be much better employed. The last few exercises on correlation, distinctions, synonyms, and references in phrases and words, will severely test the knowledge of not a few teachers.

D. Mauer's *New Mode of Geometrical Demonstration* (Brown, Aberdeen) is ingenious and worthy of a perusal.

The Commonhealth. By Benjamin Ward Richardson, M.D., F.R.S. (London: Longmans, Green, & Co. 1887.)—The extent to which we hold our health—nay, the duration of our very lives—in our own hands is in no way more forcibly illustrated than by the returns of mortality issued by the Registrar-General; and, to take a simple illustration, the comparison of the death-rate in the metropolis in 1827 with that in 1887 can scarcely fail profoundly to astonish any one who makes it for the first time. Dr. Richardson is among the best known of our sanitary reformers, and, if we are sometimes tempted to credit him with an amount of enthusiasm and optimism not wholly according to knowledge, no one can deny or ignore the yeoman's service he has done towards improving the health of his fellow-countrymen. His latest volume, of which the title heads this notice, consists of a collection of essays and addresses, most of which have previously been delivered in public, but one and all of which are well worthy of perusal in their collected form. Very notably is this the case with regard to his "Essays on Education," the common-sense of his remarks on the School Board system commending itself to every one not afflicted with our present Chinese craze for cramming and competitive examination. Dr. Richardson's papers on "Diseases incidental to Public Life"; "Woman as a Sanitary Reformer"; "Dress in relation to Health"; and "Cycling as a Health Pursuit" must each appeal to a large circle of readers. That on "Upper and Lower London," of all those in the volume, appears to us a little too Utopian.

History of the Boers in South Africa. By George McCall Theal. (London: Swan Sonnenschein, Lowrey, & Co. 1887.)—We have only to read any Parliamentary debate on our South African difficulties during the past few years to be convinced how curiously ignorant Englishmen, as a rule, are of the true history and present condition of affairs in the vast country or countries surrounding our colony at the Cape. We welcome, then, a history of people with whom our relations have been so largely of a hostile character, written by an impartial observer, with neither party ties nor prepossessions to warp his judgment. In fact, it is the rigid impartiality of Mr. Theal's book which constitutes its chief value, and imparts to it its highest interest. While he recognises the value of missionary effort, the missionaries themselves, as depicted in his pages, certainly would not seem to be fairly describable in the words of Malachi, ii. 6; while, as for the Boers, many of their utterances, even in public documents, evoke irresistible reminiscences of the exclamation of the Irishman: "Dthrunk or sober, thank the Lord, no one niver gat the thruth out o' me!" Mr. Theal has made an addition of real value to our knowledge of the existing state of Southern Africa, and a study of his pages might even conceivably enable us to avoid one of the wretched little wars which are imminent wherever civilised and semi-civilised or savage races are conterminous.

A Misunderstood Miracle. By Rev. A. Smythe Palmer, B.A. (London: Swan Sonnenschein, Lowrey, & Co. 1887.)—Here is a melancholy instance of time wasted and scholarship perverted in an attempt to explain the mythical legend in Joshua x. 12–14. Verily Mr. Palmer's title is an appropriate one, inasmuch as we can scarcely conceive any much more serious misunderstanding of this story than to regard it as the record of a miracle at all. We wonder whether the author of this little book has ever reflected on the impious audacity of supposing that the Infinite Author of the Universe would suspend the inexorable laws of Nature in order that one semi-savage tribe might the more effectually slaughter another in a valley in a corner of Asia. Presumably Mr. Palmer preaches the doctrine of forgiveness of our enemies, the while illustrating the justice of the command by the assumption that He who uttered it darkened the very sun in the sky, that He might exterminate those who offended Him! This is playing into the hands of "Saladin" and Company with a vengeance.

The Temperaments: their Study and their Teaching. By Alex. Stewart, F.R.C.S. Edin. (London: Crosby Lockwood & Co. 1887.)—Inasmuch as the word "temperament" is often employed in a manner or sense in which it can only be regarded as a solecism, Mr. Stewart, who is clearly an enthusiast on his subject, has set himself rigidly to define the four orthodox "temperaments" (the Sanguine, the Bilious, the Lymphatic, and the Nervous) and their various combinations; to indicate by what external physical signs their existence may be inferred; and to show in what manner intellectual capacity and character are modified by them. In a tabular "scheme" of the four simple temperaments, our author sets forth in parallel columns the physical and mental characteristics which distinguish them; and subsequently shows how combinations of these temperaments give rise to corresponding changes both in mind and body. Illustrations in support of his contention are derived by Mr. Stewart from various eminent men and women, some of whose portraits appear in the plates bound in with the book. That a large substratum of fact underlies his hypothesis can scarcely be doubted; and assuredly the study of the temperaments must be at once a more profitable and scientific one than an investigation of the vagaries and puerilities of cheiromancy, which is—or has recently been—so fashionable. A good deal of information of an odd and out-of-the-way kind, to say nothing of amusement, may be gathered from the pages before us. The book is beautifully printed and got up.

Outlines of Quantitative Analysis. By A. Humboldt Sexton. (London: Charles Griffin & Co. 1887.)—In this unpretending little volume Mr. Sexton introduces the student who has familiarised himself more or less with qualitative analysis to the more practically useful and interesting methods of analysing both organic and inorganic substances quantitatively. His directions are simple and perspicuous, and his illustrations sufficiently numerous and good. It is well suited to its purpose.

The Theories of Anarchy and of Law: A Midnight Debate. By H. B. Brewster. (London: Williams & Norgate. 1887.)—What Goldsmith said of Johnson—that he made his little fishes talk like whales—is applicable, to a considerable extent, to the author of the curious book whose title heads this notice. Certainly Mr. Brewster would have secured more attention and consideration for his views had he cast his dialogue in a somewhat less pedantic and academic form; for surely no four living men ever talked for the hour together in the stilted periods and with the scholastic diction of his interlocutors, Ralph, Wilfrid, Lothaire, and Harold. We must refer the reader to the book itself for its author's theory of life and ethics, and leave him, or her, to decide how far the reduction of that theory to practice would conduce to the happiness of mankind at large.

Gleanings in Old Garden Literature. By W. Carew Hazlitt. (London: Elliot Stock. 1887.)—All lovers of the innocent pleasures of a garden will revel in Mr. Hazlitt's quaint and curious extracts from forgotten horticultural

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literature. Of course, Evelyn, Bacon, Sir William Temple, and other owners of famous gardens figure largely in his pages, and much interesting information will be found as to the early cultivation in this country of vegetables now procurable by, and familiar to, the very poorest of the population. It is strange to read of the market-gardens at Battersea, and of the nursery-grounds at Brompton (existing during the memory of many who will read these lines), where miles of streets, crescents, "gardens," and squares now cover the ground. Something will be found in Mr. Hazlitt's pages to interest every one, from the owner of the lordly garden, with its acres of glass, to the possessor of a window-box full of mignonette or tropœolum.

The Fungus-Hunter's Guide and Field Memorandum Book. By W. Delisle Hay, F.R.G.S. (London: Swan Sonnenschein, Lowrey, & Co. 1887.)—In the handy little volume before us Mr. Hay gives descriptions, amply illustrated, of all the British fungi, interleaving it with ruled paper for notes and memoranda in the field. By means of two "keys" prefixed the order and genus of any fungus may be found, and then in the list of genera the "find" may be hunted down. A valuable feature in Mr. Hay's book is the distinction of fungi into esculent, doubtfully esculent, poisonous, supposed to be poisonous, and unknown. No one who will carefully note the letters appended to the description of each species can have the slightest excuse for eating even an unwholesome kind of fungus, and on this ground alone the work may be commended to the gourmet as well as to the scientific botanist.

Hungary. By Arminius Vambéry, with the collaboration of Louis Heilprin. (London: T. Fisher Unwin. 1887.)—If ever the history of a country could be epitomised in the phrase of our liturgy, "Battle, murder, and sudden death," it would be that of Hungary, as narrated by Professor Vambéry in the new volume of the "Story of the Nations" series now before us. From the date of the conquest of the Pannonians by Tiberius down to the days of Kossuth, Görgei, and Batthyáni, war, civil or exotic, slaughter, and rapine appear to have formed the chronic conditions of existence of the inhabitants of the country to the west of the Carpathian Mountains. The patriotism, not to call it the partisanship, of Professor Vambéry lends a colouring to the whole narrative; and the reader will scarcely be surprised to find what is praised in the Hungarian as bravery and justifiable artifice denounced as cruelty and treachery when practised by his enemies. But, allowance made for this, the student of history will find in the work before us an interesting account of the persistent struggles for freedom of a most gallant and interesting nationality.

Boys and Masters. By A. H. Gilkes, M.A. (London: Longmans, Green, & Co. 1887.)—Mr. Gilkes calls "Boys and Masters" "a story of school life," but there is an amount of imagination in this description which is not always to be found in a narrative whose distinguishing feature is its exiguity. Certainly Mr. Gilkes's boys are very natural boys, and many of us will excite or revive reminiscences of our own school and schoolfellows in reading of their sayings and doings. Presumably, too, the masters are equally natural as depicted when, so to speak, off parade; but of this, for obvious reasons, we can speak less confidently. Apparently Mr. Gilkes's aim seems to be to insist upon the responsibility of parents in connection with the education of their children; but, if so, pretty sustained attention is needed to discover it. Whether it was the *spretæ injuria formæ* that drove Dr. Scott to resign his mastership, or what, we are as ignorant now as we were before we opened the book.

Matter and Energy. By B. L. L. (London: Kegan Paul, Trench, & Co. 1887.)—"What," asked *Punch*, in his imperishable epitome of metaphysics, "is mind? No matter. And what is matter? Never mind." Pursuing a parallel path, "B. L. L." regards matter as a mere figment of the imagination, and energy as the sole entity in the universe. We wholly fail to see upon what ground our author would be justified in predicating the objective existence of his father and mother, who must, upon his showing, be simply resolved into a bundle of his own sensations and into nothing else in the world.

England's Ideal, &c. By Edward Carpenter. (London: Swan Sonnenschein, Lowrey, & Co. 1887.)—This mass of Communistic trash is pretty obviously the work of a man who, failing to emancipate himself from his own social stratum, proposes to regenerate society by dragging everybody down to his own level. The author's ignorance of the manners, customs, and modes of thought and feeling of the classes he so scurrilously abuses would be ridiculous were it not so utterly contemptible. This is a species of literature which may suit such as can read of the drunken loafers who follow Hyndman, Champion & Co. into Trafalgar Square, but can only excite disgust in, and wholly repel, any tolerably educated, fair-minded Englishman, be his social rank what it may.

The London Weather Chart, 1887. By B. G. Jenkins, F.R.A.S. (London: R. Morgan.)—Mr. Jenkins appears to us to be, as nearly as may be, as often wrong as he is right, which is only another way of saying that his predictions are made upon no sound scientific principle whatever. Taking the month in which this is written (August) he summarises his expectations thus: "Barometer rather low first half of the month" (up to the 13th it was really very high), "bringing rain and decrease of temperature" (the protracted drought and great heat must be fresh in the memory of all our readers). "Violent gale probably about the 4th" (no gale whatever happened; there was a thunderstorm on the 15th–16th). So far Mr. Jenkins was ludicrously wrong. "Fine the last half of the month, with, however, rain towards the close," represents a little, and only a little, more accurately what really occurred. Now, if Mr. Jenkins's predictions had proved correct in any considerable majority of cases the presumption would be that he really had hit upon the law governing the weather of the metropolis. On the other hand, if he were persistently wrong, it would appear that he was on the track of *a* law, but had mistaken its signification. When, however, he is, as we began by remarking, about half wrong and half right, the conclusion is irresistible that his vaticinations are about as valuable as those of Murphy or Zadkiel, neither more nor less so.

The Management of the Eye, Ear, and Throat. By Henry Power, F.R.C.S., George P. Field, and John S. Bristowe, M.D., F.R.S. *The Management of the Skin and Hair.* By Malcolm Morris, F.R.C.S. Edin. (London, Paris, New York, and Melbourne: Cassell & Co.)—These two valuable little books are reprinted from that large and elaborate work, "The Book of Health," issued by the same publishers; and may be confidently recommended as thoroughly trustworthy guides to the self-management of those organs of the human body of which they respectively treat. On the importance of the preservation of sight, hearing, and speech throughout life, it would be idle to insist; and the non-professional reader will find in the first volume of those whose titles head this notice, the plainest and most explicit directions for that purpose. Mr. Malcolm Morris's work should in addition become popular with the fair sex, inasmuch as in the skin and hair reside some of the most striking and important elements of female beauty;

and ladies will find a quantity of information which cannot fail to be of value to them between its two covers. To follow Mr. Morris's injunctions in their integrity should insure a clear complexion and abundant tresses at an age when, alas! but too many have fallen hopelessly into the hands of the cosmetique makers and friseur; and on this ground alone his small volume may be commended to all who wish to preserve their original charms undimmed.

Syllabus of Elementary Geometrical Conics. (London: Swan Sonnenschein, Lowrey, & Co.)—This small volume is issued by the Association for the Promotion of Geometrical Teaching, and will be found handy by the student as an aid to memory.

The Watch-Jobber's Handbook. By Paul N. Hasluck. (London: Crosby Lockwood & Son. 1887.)—This latest of Mr. Hasluck's thoroughly practical little books will be found very handy as a book of reference by country watchmakers in out-of-the-way places, and by learners and apprentices everywhere. In point of fact, any amateur mechanic familiar with the use of tools ought, after a careful study of this volume, to be able to clean and adjust any ordinary horizontal or lever watch, though probably a chronometer or duplex one might prove a little beyond his capacity. The first forty-nine pages of the work are devoted to a detailed description of the methods of cleaning, repairing, and adjusting watches, the remaining ninety-one being devoted to a profusely-illustrated glossary of technical terms, something like that contained in Mr. Britten's well-known book. There is a very good index to it.

Black and White. Nos. 6 and 7. (Manchester: 1887.)—A weekly illustrated pennyworth, with lithographed portraits of famous cricketers and more or less artistic landscapes. "Daisy Nook" belongs to the former class.

A Lecture . . . on Diseases of the Hair: and a Lecture on Baldness and Ringworm. By James Startin. (London: Harrison & Sons.)—We are glad to find a man of Mr. Startin's eminence delivering the two lectures reported in this little pamphlet to the Hairdressers' Guild, and it is much to be hoped that it will also be read by those upon whom the members of the said guild operate. Certainly, were any hairdresser to imagine a customer to be familiar with its contents, he would think twice before telling that customer what a member of the craft not many years ago assured the present writer, that plenty of people who found Sir Erasmus Wilson's prescriptions fail had been cured of baldness by the application of his "Balsam of Ecbatana" (or some such rubbish)!

A B C Five-Figure Logarithms. By C. J. Woodward, B.Sc. (London: Simpkin, Marshall, & Co.)—This is a very handy little book indeed, containing the logarithms of numbers from 1 to 9999 to 5 places of decimals, with analytical factors, and other tables useful in the laboratory. The differences in Table I. are arranged on a simple plan, and the tables themselves are indexed, ingeniously enough, ledger fashion, so that the finger being placed upon the index of the page required the book opens at it at once.

Intelligence in the Van. By Horace Dobell, M.D. (London: Wertheimer, Lea, & Co.)—The visible Universe had its origin in "Potentia." When poor creatures like Darwin, Huxley, Romanes, and their fellows assert that mind is a development as much as man's material organisation, and that it has passed through its successive stages from the lowest to the highest, they talk nonsense, because Dr. Dobell knows better. Vitality was one of the modes of Potentia, and so the world became peopled with life; with voluntary locomotion came mind, and mind in man assumed the mode of soul. Every animal possesses aspiration, but in the lower animals it is directed objectively. Directed subjectively in man it becomes soul. Professor Romanes weakly traces the development of mind from reflex action through instinct to intelligence or reason. Dr. Dobell says, No. The order must be reversed, and we must have intelligence in the Van. Hence the title of his tract. We can only trust that the reader follows the line of argument. If we may borrow a piece of American slang, Dr. Dobell's appears to be a very "one-horse" Van, placed studiously before the animal which should draw it.

Mechanical Dentistry. By Charles Hunter. Third Edition. (London: Crosby Lockwood & Co. 1887.)—That this volume of "Weale's Series" should already have run into a third edition affords a tolerable indication of its use and value to the dental profession. Moreover, at a time when a leading dentist has cheerfully declared that, fifty years hence, not a man, woman, or child in the United Kingdom will have a sound tooth in his or her head, it may not be wholly uninteresting to the general public to learn something of the elaborate mechanical devices employed (as Mr. Samuel Weller observed) "to assist Natur'" when their normal masticatory apparatus fails them.

Mr. W. H. Collins sends us *A Proposed Alteration in the System of Playing off Minor Events in Lawn-tennis Tournaments*, which he thinks will be fairer to those who compete for prizes. It seems decidedly more complicated than the existing system.

The Mammoth and the Flood. By H. H. Howorth, M.P., F.S.A. (Sampson Low & Co.)—This book is dedicated to the Duke of Argyll, who is just now cock-a-hoop at the discovery that Darwin's theory of the formation of coral islands has been disproved by the researches of the *Challenger* naturalists, and who consequently thinks that the whole theory of the origin of species is on its last legs. *Ex pede Herculem.* Mr. Howorth is fighting shadows, bringing needlessly heavy and cumbersome artillery in the shape of this big volume against uniformitarianism. The quotation which he gives from Professor Huxley as to the place of "catastrophes" as part and parcel of the uniform operation of agencies varying in degree and intensity of action disposes of the matter, and we therefore think that the author has wasted abilities which, as his valuable "History of the Mongols" shows, are of no mean order. We are none the less glad to have his collection of legendary and true materials concerning the mammoth gathered together, but we fail to see that the positions of the skeletons of that last of man's contemporaries among the larger mammals warrants the author's inference of a universal flood. The geological evidence in support of this is, however, reserved for publication in another volume.

Saga Time. By J. Fulford Vicary. (Kegan Paul, Trench, & Co.)—We regret to learn that the author of this clear and lively account of the men who wrote the famous Sagas and of the leading Sagas themselves has passed beyond the sound of the critic's praise or blame, and the more so as we can speak well of the way in which he has discharged his task. He has caught the spirit and temper of the stirring times described, when life was an unending battle and feasting bout; the Sagas, with their tales of king, courtier, warrior, thrall, and freeman, woven deftly by the honoured skalds, the insight which they give into law, custom, and belief are all set before us in unaffected and vigorous English. The general sketches are followed by a careful and useful abstract of the Volsunga-Saga. If it lacks the pleasant archaic flavour of Cox and Jones's summary in their "Popular Romances," it gives the reader compensation in the explanatory matter embodied in it. Altogether the book is one to be heartily commended to the

student of Northern life and custom as a sound and trustworthy introduction to subjects exhaustively treated in works like the "Corpus Poeticum Boreale" of York Powell and Vigfusson.

Animal Biology. By C. Lloyd Morgan. (Rivingtons.)—This is a thoroughly practical book, sufficient for the medical student, for whom it is primarily intended, and, withal, untechnical enough to be enjoyed by the general reader. Acting on the sound principle that when once the form and function of a given organism have been mastered its relation or unrelation to large groups is clear, the author selects typical representatives of each sub-kingdom, illustrating his expositions by diagrams, which are to be preferred to pictures in all guides to laboratory work.

The English Illustrated Magazine, 1886–87. (Macmillan & Co.)—The present volume fully maintains the high level of its predecessors. The delicacy and, withal, vigour of the woodcuts evidence that our engravers need not fear the competition of their American rivals. As for the letterpress, it suffices to say that B. L. Farjeon, Marion Crawford, Grant Allen, and the late Richard Jefferies are among the contributors.

Messrs. Longmans send us a cheap edition of that lively story of travels, *Three in Norway*, by Two of Them, on which the public has wisely set its seal of approval. Messrs. Blackwood have issued the twelfth edition of the late David Page's *Introductory Text-book of Physical Geography*, to which Professor W. D'Arcy Thompson adds a revised chapter on animal and plant distribution.

We have also to acknowledge the current issues of *Longman's Magazine*, with a pleasant paper on "Independent Travelling," by Mr. Hamerton, and the opening chapters of a new story by the fecund author of "Mehalah"; of the *Century*, *St. Nicholas*, and the *Westminster Review*, which has an article on the poetry of George Meredith, inviting attention to works which his prose tends to obscure. Travellers to the Ardennes should put Percy Lindley's *Walks* (W. H. Smith & Son) in their pockets, as a guide-book worth six shillings instead of the sixpence it costs; and our microscopist readers may be reminded that Mr. Cole's *Microscopical Science Studies* (Hammond & Co., Birmingham) continue to merit their support. They will be worth keeping.

THE FACE OF THE SKY FOR OCTOBER.

By F.R.A.S.

THE outburst of solar activity to which reference has more than once been recently made here seems to have subsided, and sun spots are now few, small, and infrequent. The zodiacal light is visible before sunrise in the east. The night sky is delineated in map x. of "The Stars in their Seasons." Minima of Algol. ("The Stars in their Seasons," map xii.) will occur at 12h. 50m. P.M. on the 3rd, at 9h. 39m. P.M. on the 6th, at 6h. 28m. P.M. on the 9th, at 11h. 21m. P.M. on the 26th, and at 8h. 10m. P.M. on the 29th, and at other times more inconvenient for the amateur observer. Mercury is an evening star all through the month, and attains his greatest eastern elongation from the sun (23° 48′) in the early morning of the 27th. He is too near the horizon now, though, especially towards the end of the month, for the observer to have any reasonable chance of seeing him. Venus is a morning star throughout October. She attains her greatest brilliancy on the 28th, and, should the sky be sufficiently clear about that date, may be caught with the naked eye in bright sunshine, by any one who knows exactly where to look for her. She exhibits a beautiful crescent in the telescope. Neither Mars nor Jupiter are, for the purposes of the ordinary amateur observer, visible. Saturn is a morning star; he rises at midnight at the beginning of October, and soon after 10h. P.M. at the end of it. His ring system is sensibly the same as it was on his departure early in the year. He will be found below the Præsepe in Cancer ("The Stars in their Seasons," map ii.). Uranus is invisible, coming, in fact, into conjunction with the sun on October 6. Neptune may be seen before midnight, in that void part of the sky south of a line joining the Pleiades and γ Tauri ("The Stars in their Seasons," map. xii.). He looks like a 7–8th magnitude star, but shines more steadily than any in the neighbourhood, and is of a slightly bluish tinge. The moon is full at 3h. 47·3m. A.M. on the 2nd, enters her last quarter at 4h. 57·4m. A.M. on the 10th, is new at 10h. 35m. on the night of the 16th, enters her first quarter at 5h. 45·8m. P.M. on the 23rd, and is full for the second time this month at 9h. 30·9m. at night on the 31st. High tides may be looked for on the 16th and 17th. No less than eleven occultations of fixed stars by the moon occur at convenient hours during the present month. On the 6th, 75 Tauri, a star of the 6th magnitude, will disappear at the bright limb of the moon at 10h. 45m. P.M., at an angle from her vertex of 102°. It will reappear at her dark limb at 11h. 39m. P.M., at an angle of 215° from her vertex. On the same night θ^1 Tauri, of the 4½th magnitude, will disappear at the bright limb at 10h. 54m. at a vertical angle of 350°, reappearing at the dark limb at 11h. 8m., at an angle of 325° from the vertex of the moon. Later still B.A.C. 1391, of the 5th magnitude, will disappear at the bright limb at 11h. 45m. at an angle of 29° from the moon's vertex; and will reappear at her dark limb at 12h. 40m. P.M. at a vertical angle of 295°. On the 8th 71 Orionis, a 5½th magnitude star, will disappear at the bright limb of the moon at 11h. 56m. P.M. at an angle from her vertex of 59°, reappearing at her dark limb at 1h. 1m. A.M. on the 9th at an angle of 237° from her vertex. On the 23rd σ Capricorni, a 5½th magnitude star, will disappear at the dark limb of the moon at 8h. 18m. P.M. at an angle of 113° from her vertex; it will reappear at her bright limb at 9h. 29m. P.M. at an angle from her vertex of 327°. On the 24th θ Capricorni will disappear at her dark limb at 4h. 32m. P.M. at an angle of 78° from her vertex, and will reappear at 5h. 52m. P.M. at her bright limb, at a vertical angle of 277°. On the 26th, 70° Aquarii, of the 6th magnitude, will disappear at the dark limb at 7h. 50m. P.M. at an angle of 88° from the vertex of the moon; its reappearance, 323° from the lunar vertex, occurring at 9h. 7m. P.M. On the 28th B.A.C. 81, of the 6th magnitude, will disappear at the moon's dark limb at 11h. 32m. P.M. at an angle from her vertex of 85°. It will reappear at her bright limb 21 minutes after midnight, at an angle of 12° from her vertex. On the 29th three occultations will happen, 26 Ceti, of the 6½th magnitude, disappearing at the dark limb of the moon at 7h. 22m. P.M. at an angle of 87° from her vertex, and reappearing at her bright limb at 8h. 37m. P.M. at an angle from her vertex of 274°. Next, at 10h. 40m. P.M., 29 Ceti, also of the 6½th magnitude, will disappear at the dark limb at an angle of 141° from the vertex of the moon; and will reappear at 11h. 57m. P.M. at her bright limb at an angle of 294° from her vertex. Thirdly, 33 Ceti, a star of the 6th magnitude, will disappear at the dark limb at 12h. 58m. P.M., 193° from the moon's vertex. Its reappearance does not occur until the next morning. We have said above that these eleven occultations occur at convenient hours; but there is a twelfth which it is well worth the while of the amateur to get up—or sit up—to observe. We refer to the occultation of Aldebaran during the early morning of the 7th. On that day, at 3h. 20m. A.M., the star will disappear at the moon's bright limb at an angle from the vertex of 42°, its reappearance occurring at 4h. 2m. A.M. at the dark limb at a vertical angle of 354°. The student will not forget that this is the star which has been seen on more than one occasion to be apparently projected on to the bright disc of the moon. At noon to-day the moon is in Pisces ("The Seasons Pictured," plate xxii.), and in the course of two or three hours passes into the confines of Cetus, from which she emerges in Pisces again at 4 P.M. on the 2nd, only, however, to re-enter the most northerly portion of Cetus at 9 P.M. on the 3rd. When she finally quits this constellation at 10 P.M. on the 4th it is to enter Aries. Her passage through the remaining part of Aries is accomplished by 4h. 30m. P.M. on the 5th. She then crosses into Taurus ("The Seasons Pictured," plate xxiii.), and travelling through it, arrives at 3h. P.M. on the 8th at the western edge of the northern prolongation of Orion. She takes just twelve hours to cross this, and at 3h. A.M. on the 9th quits it for Gemini ("The Seasons Pictured," plate xxiv.). Her journey through Gemini ends at 10h. P.M. on the 10th, and she then passes into Cancer. She remains in Cancer until 10h. A.M. on the 12th, and then crosses into Leo. Leo she leaves for Virgo at 9h. 30m. P.M. on the 14th ("The Seasons Pictured," plate xxv.), and Virgo in turn for Libra at 6h. P.M. on the 17th ("The Seasons Pictured," plate xxvi.). Journeying through Libra she reaches at 9h. A.M. on the 19th the narrow northern spike of Scorpio. By 5h. 30m. P.M. on the same day she has traversed this and come out in Ophiuchus. Here she remains until 8h. A.M. on the 21st, when she crosses the boundary into Sagittarius. By 4h. P.M. on the 23rd her passage through Sagittarius is ended, and she has entered Capricornus

("The Seasons Pictured," plate xxi.). She leaves Capricornus for Aquarius at 6h. P.M. on the 25th, and Aquarius for Pisces at 9h. P.M. on the 27th ("The Seasons Pictured," plate xxii.). After this, as at the beginning of the month, she is skirting the confines of Pisces and Cetus, being sometimes in one constellation and sometimes in the other, and it is not until 6h. P.M. on the 31st that she finally enters Aries again ("The Seasons Pictured," plate xxiii.). She is, of course, still in Aries at midnight on that day.

Our Whist Column.

By "Five of Clubs."

MATHEWS ON WHIST.

Rearranged, partly rewritten, and occasionally corrected in accordance with modern views.

Play Third Hand—*concluded.*

BE as careful what you throw away as of what you lead. It often leads to bad consequences to play a tray with a deuce in your hand. Thus, suppose your partner leads the four, your right-hand adversary the five, and you put down the tray, it ought then to be a certainty that you can ruff the next trick in the suit. [If, however, you hold the deuce, you not only cannot ruff, but as you are utterly weak, the lead of the suit by your partner is probably the worst thing he could have done.] If your partner finds the deuce in your hand, and you frequently deceive him in the same way, he loses all confidence in you, and is prevented from playing his game on similar occasions. I wish to inculcate to beginners special care in such points of whist play. Every one can attain these minor qualifications. When once the great advantage of correctness in such matters is recognised, the weakest player should strive as constantly as the strongest to attain it: attention only is necessary.

Play Fourth Hand.

With ace, knave, and another, do not win the king led by your left hand adversary. By passing it you either force him to exchange his lead or to give you tenace in his own suit. [Of course, if your right-hand adversary show signs of being short in the suit, or if a single trick makes or saves the game or a point, you should play the ace unhesitatingly. Cavendish considers it generally bad play to hold up the ace; but in the case considered by Mathews it is sound policy. Either the leader has great length in the suit or not: if he has, you have the greater reason to retain command over the suit as long as possible; if he has not, the chance of being ruffed on the second round is small.]

It frequently happens that by winning your partner's trick, when you are last player, you give him the advantage of tenace over your left-hand adversary. Thus A has king, knave (or any other second and fourth best cards), with a small one of the suit, of which Y, your partner, has the first and third and another. If A leads his small card, and Y, your partner, wins it with his small card, you, as last player, should win the trick if possible, though it is your partner's. For you thus prevent A from making a trick in the suit, which he must have done had you left the lead with Y.

Return Lead and Forced Lead.

With three, return the highest to your partner's lead. This answers two purposes: it gives your partner an opportunity to finesse, and it shows him that you held originally but three at most in the suit. With four or more, you should return the lowest.

If you win your partner's lead with the queen, do not return it (except in trumps); it is evident the ace and king are both behind you, and, since your partner certainly does not hold both, returning his lead gives the adversary the tenace.

It is generally right to return your partner's lead in trumps unless he leads an equivocal card,* such as a nine or ten [in which case, should you have reason to believe that the lead is from weakness, you exercise your own judgment as to the propriety of going on with trumps].

* So called because such a card may be led with propriety both from a strong and from a weak suit. For instance, with a quint to a king (that is, king, queen, knave, ten, nine), or with king, knave, ten, nine, nine is led; but nine is also led when it is the best of two or three in a suit. [So also ten is led from king, knave, ten with or without others, and from quart to king and one small card or more; but ten is led where it is the best of two or three.]

Beginners find it difficult to distinguish between original leads and forced leads. When a player changes his original suit, he commonly plays the best card of another, to give his partner the advantage of a finesse. To such a lead from your partner you should play as if it were your own or the adversary's: keep the commanding card, ten, ace, &c., and do not return it, as if it was an original lead.

If the fourth player wins the adversary's lead, it is better to return it than to open a new suit, unless you have such strength in this suit that you can support your partner. [You put your partner in a favourable position by returning the lead of the player on your left under such circumstances, especially if you are yourself short in the suit, and your right-hand adversary showed weakness in it. Even if the suit is ruffed on your right, you probably gain.]

When you have a moderate hand yourself, sacrifice it to your partner; if he is a good player he will act in the same manner towards you.

The Discard.

If weak in trumps, keep guard on your adversary's suits: if strong, throw away from them. [In these two rules, and in sixteen words, Mathews sums up the whole duty of the sound player in discarding.] Discard as much as possible from your partner's strong suits in either case. [Or rather, you can usually discard safely from your partner's strong suits, even at times throwing away commanding cards in it; you should be careful, however, to retain the means of leading to your partner in them, if necessary. In some cases you can with advantage throw away every card in your partner's best suit, obtaining thereby a chance of an effective ruff; but until you are sure he will be able to lead the suit himself, it is well to keep a small card or so in it to lead to him with.]

Observe carefully the original discard of each player, noting whether the discard is to the lead of the partner or the adversary of the player discarding. A discard to partner's lead is invariably meant to direct him; but a discard to a lead of an adversary is frequently intended to deceive the adversary, and induce him to lead his strong suit.

If your partner, to your winning card, throws away the best card of any suit, it shows he wishes you to know he commands it. If he throws away the second best, you may infer that he has no more.

Our Chess Column.

By "Mephisto."

ALTERNATION GAMES.

THESE games are played by four players, every person moving alternately, without consulting the other, as in the game printed below. If played quickly, these games afford a great deal of amusement to the players. The parties watch each other's play with a great deal of suppressed excitement, quite unusual in the ordinary game. Will my partner see my idea and make the right move? is always vividly impressed upon the countenance of the player who has just sacrificed a piece in a combination dependent for its success upon two or three subtle moves. The prohibition against consultation at such supreme moments is calculated to try the patience and shake the moral probity even of a saint. To stare intensely on a certain square of the board, to wriggle about impatiently on the chair, to cough when the ally is about to make the wrong move, and to communicate in all manner of ways to the partner, that a decisive combination is on, are expedients adopted by weaker mortals with not sufficient moral restraint. Such undignified conduct is unfair to the opponents, and would be painful if it were not comical. These visible and glaring attempts to infringe the law against communicating with your partner are, of course, unworthy of players of unimpeachable moral conduct: but, unfortunately, there still remains the invisible and stealthy kick under the table, to attract your partner's attention, and in certain positions I think even a saint would take to kicking, gently or viciously, as the occasion may require.

These games are very useful when two strong players are opposed to each other. The weaker partner will, in course of play, have many opportunities to see and appreciate thoroughly the superior ideas of his partner, and after the game he will have the advantage of being shown where and how he failed to pursue the right course. Having been engaged in thinking over the moves, he will be able to understand any subsequent analysis, and derive much benefit and instruction therefrom.

XUM

Alternation game played at the British Chess Club between Messrs. Harris and Gunsberg *versus* Messrs. Mills and Newnes.

SALVIO GAMBIT.

White. Mr. Gunsberg.	Black. Mr. Newnes.	White. Mr. Herris.	Black. Mr. Mills.
1. P to K4	P to K4	2. P to KB4	P × P
3. Kt to KB3	P to KKt4	4. B to B4	P to Kt5
5. Kt to K5			

(This move does not lead to an advantageous line of play, as it gives Black the option of taking the attack in his own hands. The alternative to Kt to K5 is to play the Muzio Gambit by 5 Castling. The latter is preferable. A player who does not wish to undertake the difficult attack of the Muzio, must therefore either play 4. P to KR4, leading to the Allgaier or Kieseritzky Gambits, or not play the King's Gambit at all, but resort to the Bishop's Gambit by 3. B to B4, a very sound continuation.)

5. Q to R5 (ch) 6. K to B sq Kt to KR3.

(6. P to B6 leads to a very lively and attacking continuation known as the Cochrane Gambit.)

7. P to Q4 P to Q3.

(This move is not good at this point, because, as will be seen, the Kt is better posted on Q3 for defensive purposes. 7. P to B6 is Black's best.)

8. Kt to Q3 P to B6.

(Here 8. P to Kt6; 9. QB × P: Kt to Kt5, &c., may be played.)

9. P to KKt3 Q to R6 (ch).

(This is not good; it leads to very serious loss of time, for, with the White Kt on Q3 (note, to Black's 7th move), the Black Queen is lost if she plays to Kt7, nor can she stay at R6 on account of Kt to B4. Black's best move is to retire the Q to K2, instead of checking.)

10. K to B2.

(10. K to K sq. is most advisable.)

10. Q to Kt7 (ch)

11. K to K3 B to K2.

(Black will now be compelled to give up the Queen, for two pieces —Q to K7 (ch)—gives them a better chance of equalising the game.)

12. Kt to B4 B to Kt4.

13. B to B sq B × Kt (ch) 14. K × B.

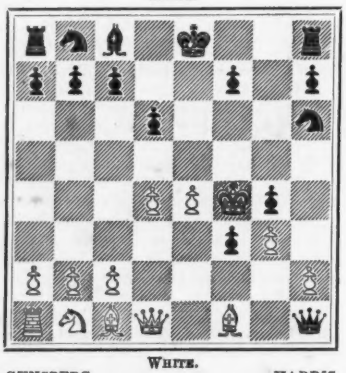
(P × B was the right move.)

14. Q × R.

(If Q to B7, then White plays B to K3.)

NEWNES. MILLS.

BLACK.



WHITE.

GUNSBERG. HARRIS.

15. B to Kt5 (ch) P to QB3 16. Q × Q P × B.

17. Kt to B3 Castles.

(By risking the P for a speedy development Black has everything, to gain, and nothing to lose.)

18. Kt × P P to B4,

(continuing in the dashing style of his partner's previous move.)

19. P to K5.

(Unnecessary caution. White might have safely played 19 Kt to B7 if then P × P (ch). 20. K to K3, Kt to B4 (ch). 21. K to B2, Kt × QP. 22. Q to Q sq. winning.)

19. P × P (ch) 20. P × P Kt to B3

21. B to Q2 B to Q2 22. R to K sq. Kt to K2!

(Black's attack is speedily growing very embarrassing to White. If the latter now replies with Kt to B3 he shuts off his own B and Black would probably continue QR to K sq. Perhaps 23 Kt to Q6 was White's best.)

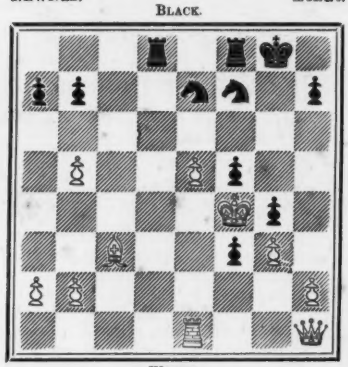
23. P to B4 B × Kt 24. P × B QR to Q sq!

(If White attempts to withdraw his K by K to K3 he will lose a piece, as Black would reply with P to B5 (ch)!)

25. B to B3 Kt to B2!

NEWNES. MILLS.

BLACK.



WHITE.

GUNSBERG. HARRIS.

(A fine idea! it would be too dangerous for White to stay with his K on B4 much longer. White cannot play R to Q sq. on account of Kt to Q4 (ch)! Or if 26. P to K6, Kt to Q4 (ch). 27. K × P to B7. (I do not see any other good move.) 28. P × Kt (ch), R × P (ch). 29. K × P, Kt to K6 (ch). 30. R × Kt, P to B8 (Q). 31. Q × Q, R × Q, and the game is equal. This is, I believe, the best result that White can attain. White can, of course, vary the proceedings at every move of this interesting position, but it may safely be assumed that the discovered checks in connection with the timely advance of the P to B7 would mostly win. Again, if 26. Q to B sq, P to B7. 27. R to B2 (best), Kt to Q4 (ch). 28. K × P, Kt × B. 29. P × Kt (best), Kt × P (ch). 30. K to K4 (best), Kt to B5, and Black will win. White can play 31. R × P, Kt to Q7 (ch). 32. R × Kt, QR to Ksq (ch), wins the Queen. A careful analytical examination of the position in this diagram will afford amusement as well as instruction.)

26. K to K3 Kt to Q4 (ch)

27. K to Q3 (best).

(If 27. K to Q2, Kt to Kt5 (ch), winning the exchange; or if 27. K to B2, Kt × B. 28. P × Kt. 29. R to Q7 (ch), K to Bsq, Kt to Kt4, with a won game.)

27. Kt to Kt4! 28. K to B2 Kt to K5

29. R to KBsq

(29. Q to Bsq seems better, but then Black could play R to Bsq with a strong game.)

29. Kt to K6 (ch) 30. K to Ktsq P to B7

31. P to K6 R to Bsq 32. P to KR3

I quote this game from memory some considerable time after it had been played. I cannot recollect the continuation from this point. Black won by Queening his Pawn at a later stage. But they might have won at once by Kt to Q7 (ch). 33. K to Rsq (if B × Kt then R × R (ch) wins), P to B8 (Q); and if 33. R × Q, Kt to B7 mate.

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XUM